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CANADIAN MACHINERY AND MANUFACTURING NEWS

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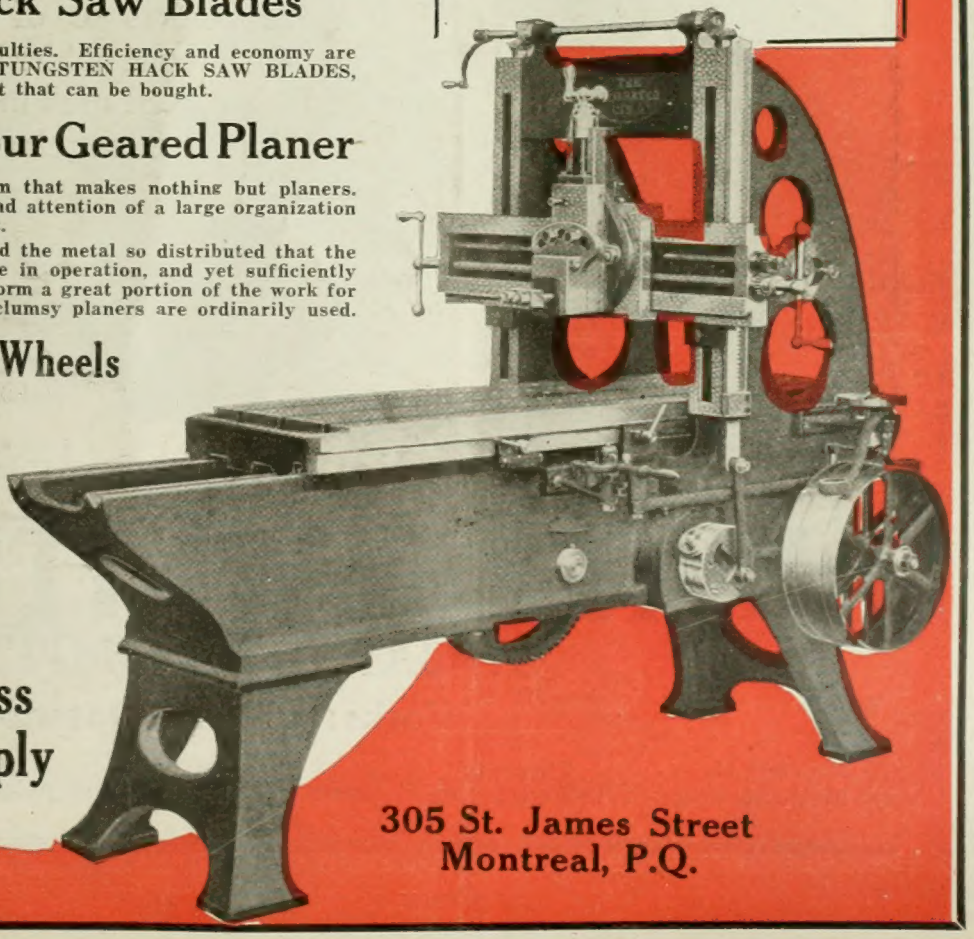
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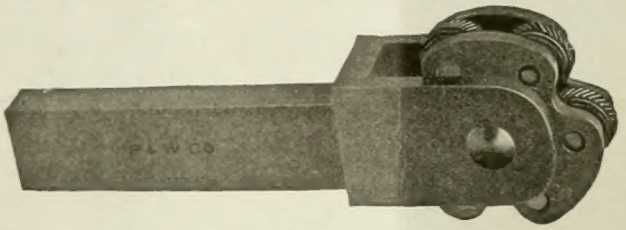


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is assured at our nearest store where P. & W. Small Tools are carried in stock. Place your order there to-day.

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Motor Driven through speed box. Built in sizes from 42-inch. to 100-inch.

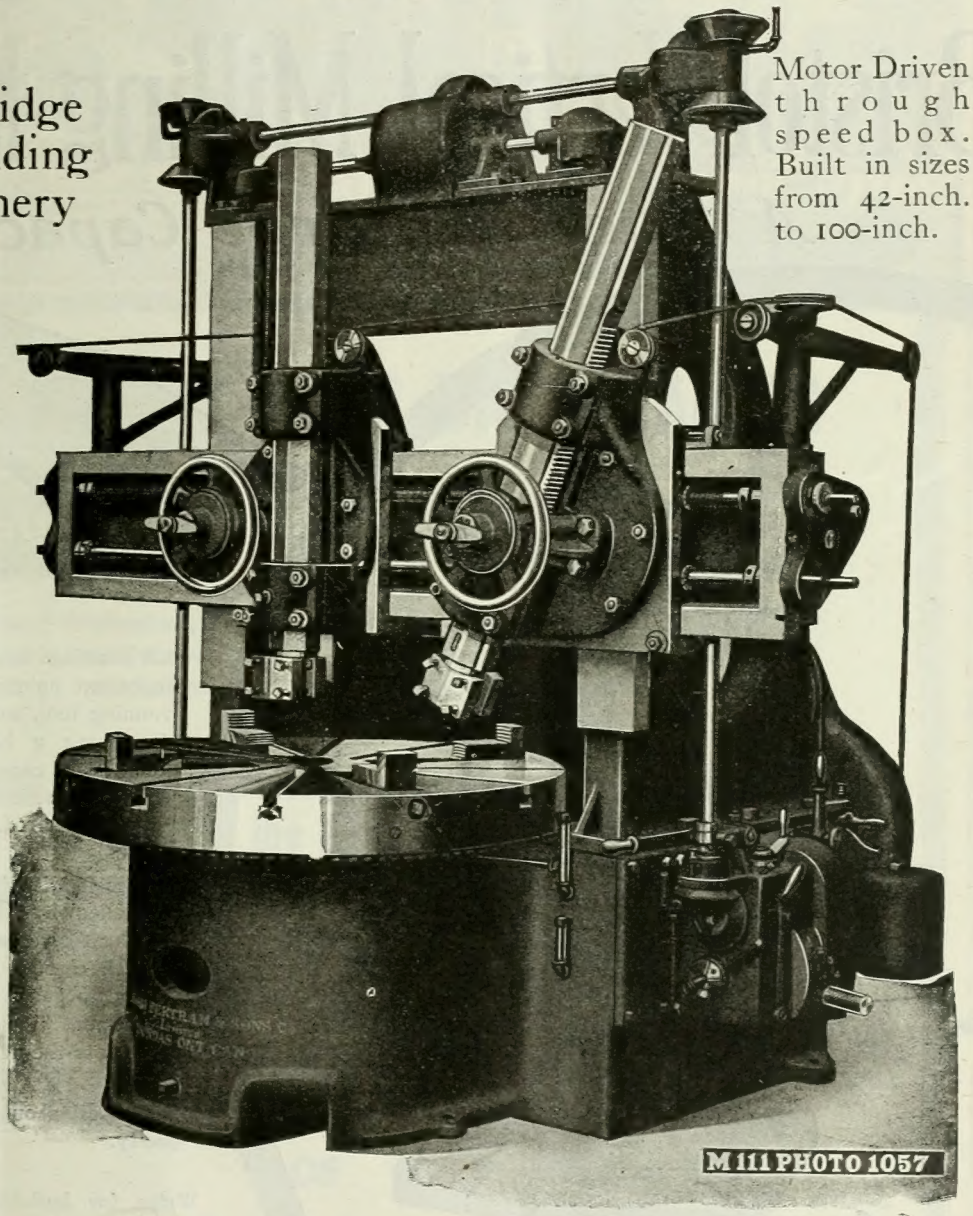
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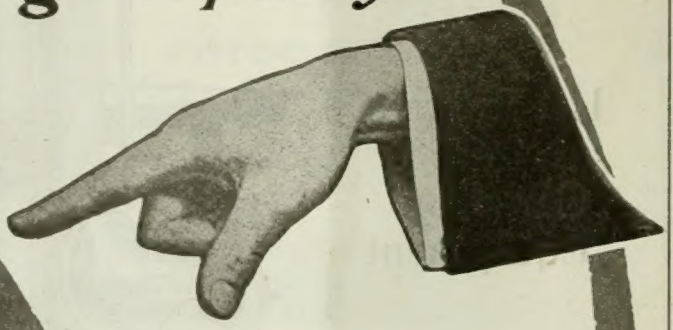
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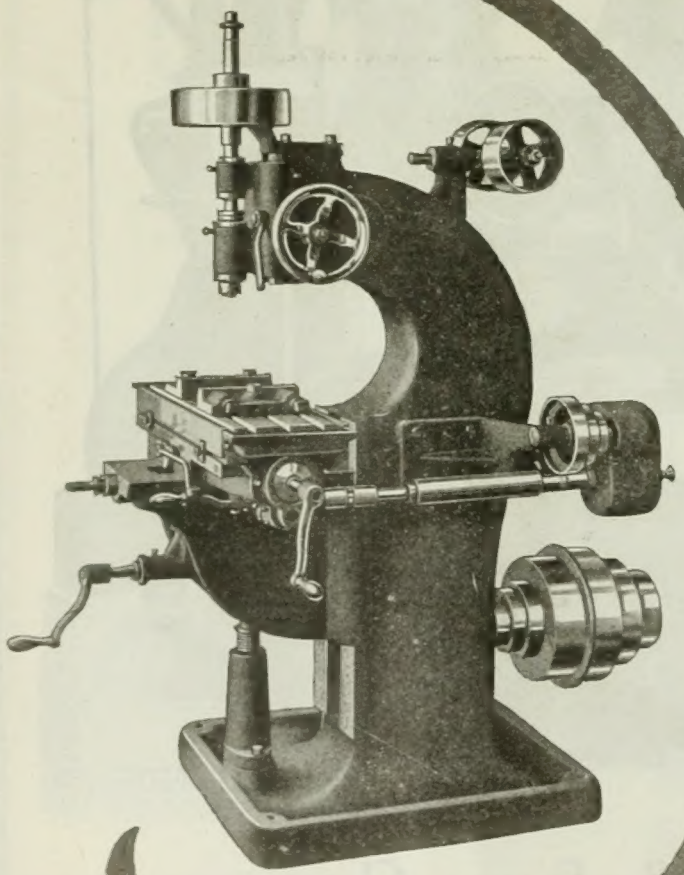
Canadian Machinery and Manufacturing News, September 11th, 1919. Vol. 22, No. 11. Published weekly at 143-153 University Ave., Toronto, Canada. Subscription price in Canada, $3; United States, $3.50. Entered as second-class matter at the Post Office Department, Ottawa, Canada. Entered as second-class matter July 1, 1912, at the Post Office at Buffalo, under the Act of March 3rd, 1879.

BRISTOOL

Bristol Vertical Milling Machine

A Tool of Large Capacity





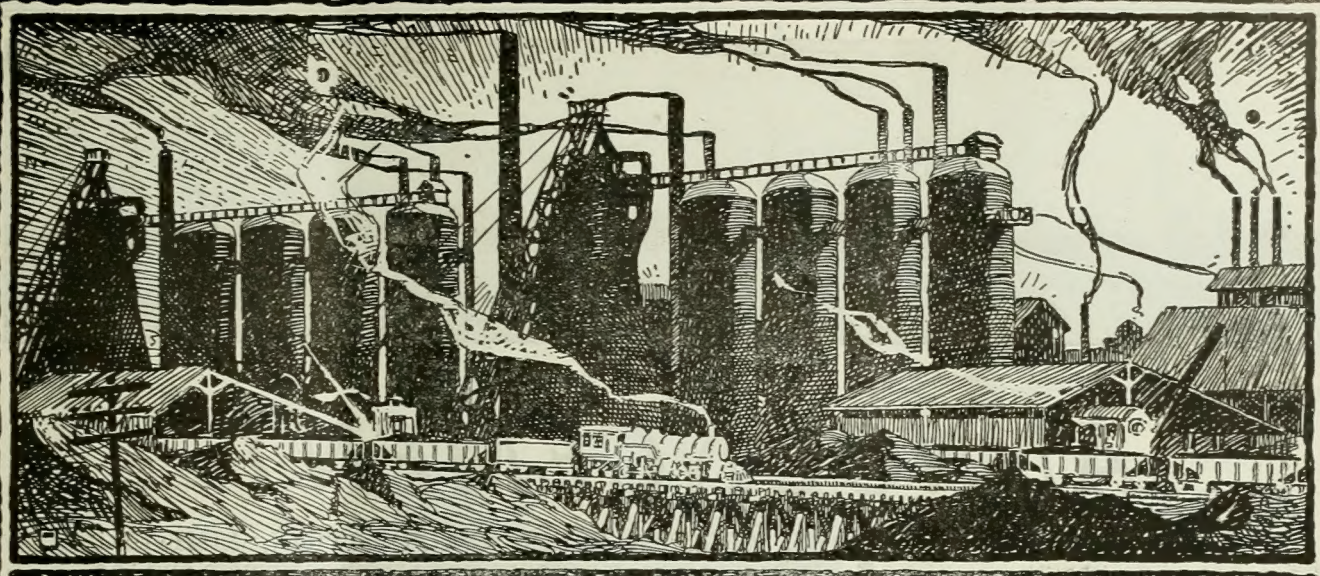
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The longitudinal table feed is controlled by the gear change box which gives six different feeds for each change of spindle speed. A stop to gauge with micrometer adjustment is used on the head to regulate the depth of cuts.

Learn all about its production capacity.

Write for bulletin giving fullest particulars.

BRISTOL MACHINE TOOL CO.
SUCCESSORS TO C. G. GARRIGUS MACH. CO.
BRISTOL, CONN.



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According to "Webster," Quality is "an excellence of character; natural superiority."

Service

Webster's definition of "Service" is; "The performance of labor for the benefit of another."

We use these words advisedly—fully understanding their definitions—and realizing the obligation we place upon ourselves by their continued use in connection with our products of Iron and Steel, and our attitude to the people we serve.

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STEEL COMPANY

OF

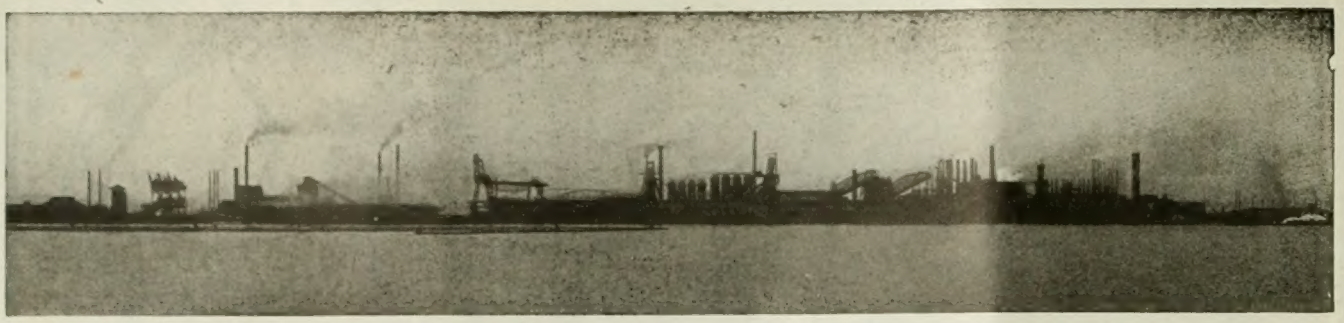
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of every description.



General View of the Plant of the Algoma Steel Corporation from the Waterfront.

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The following are the sections which will be rolled:---

ANGLES—Equal Leg—
6 x 6"—5 x 5"—4 x 4"
3½ x 3½"—3 x 3"
2½ x 2½"—2¼ x 2¼"
2 x 2"—1¾ x 1¾"
1½ x 1½"—1¼ x 1¼"

ANGLES—Unequal Leg—
6 x 4"—6 x 3½"—5 x 4"
5 x 3½"—5 x 3"—4½ x 3"
4 x 3½"—4 x 3"—3½ x 3"
3½ x 2½"—3 x 2½"—3 x 2"
2½ x 2"

BEAMS—
15", 12", 10", 8", 6", 5", 4", 3".

CHANNELS—
15", 13", 12", 10", 8", 6", 5", 4", 3".

ZEES—
3¼ x 5 x 3¼ x 5/16
3 5/16 x 5 1/16 x 3 5/16 x ⅜"
3⅜ x 5⅛ x 3¾ x 7/16"
3 1/16 x 4 x 3 1/16 x ¼"
3⅛ x 4 1/16 x 3⅛ x 5/16"
3 3/16 x 4⅛ x 3 3/16 x ⅜"
2 11/16 x 3 x 2 11/16 x ¼"
2¾ x 3 1/16 x 2¾ x 5/16"

ROUNDS—
All sizes from ½" up to and including 4".

SQUARES—
All sizes from ½" up to and including 3".

FLATS—
All sizes from 1 x ¼" up to and including 14" wide.

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All sections from 12 lbs. up to and including 45 lbs. per yard.

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Machine cast FOUNDRY MALLEABLE and BASIC.

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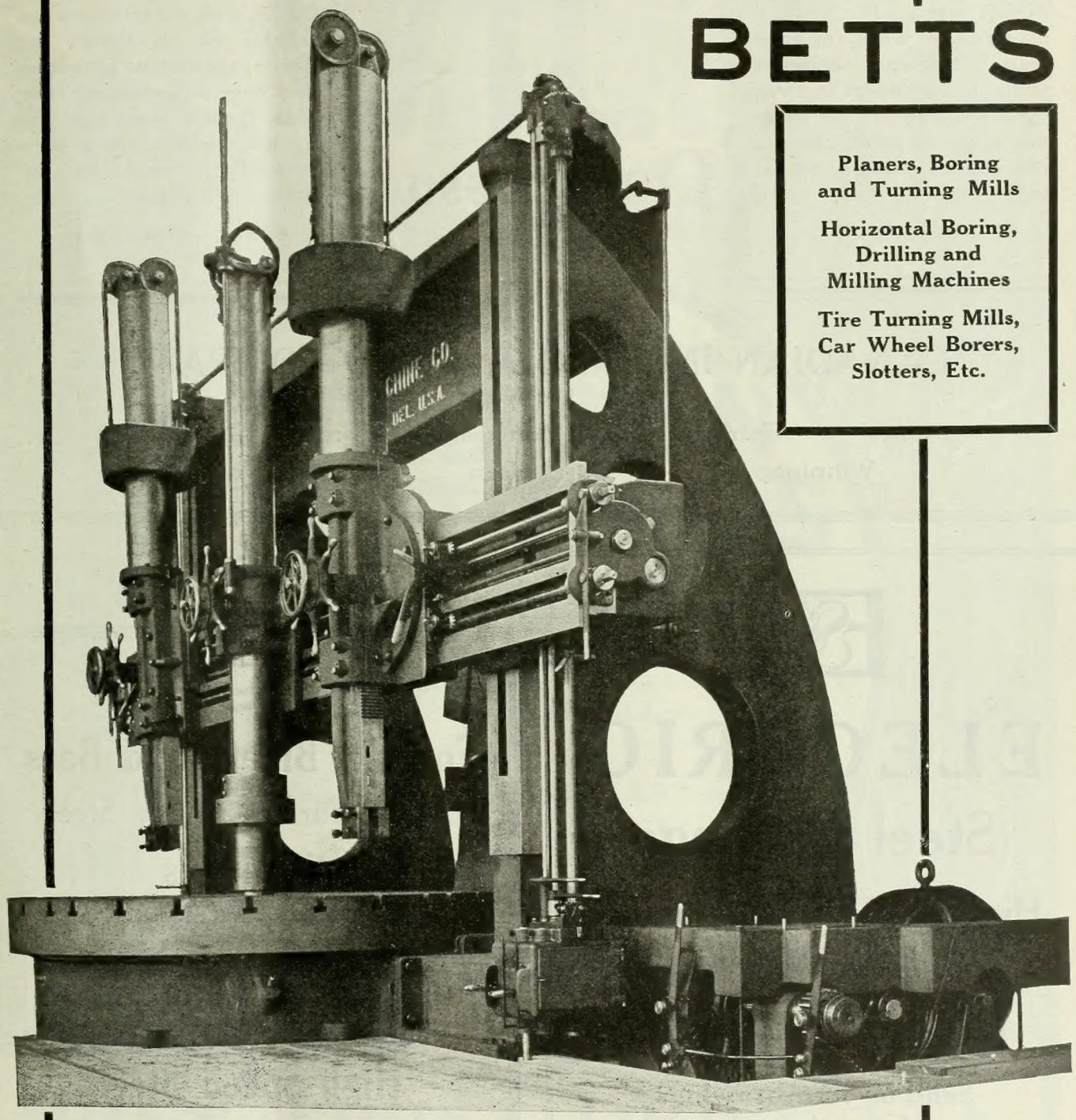
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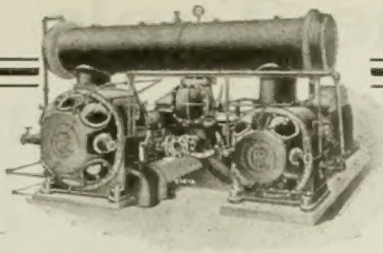
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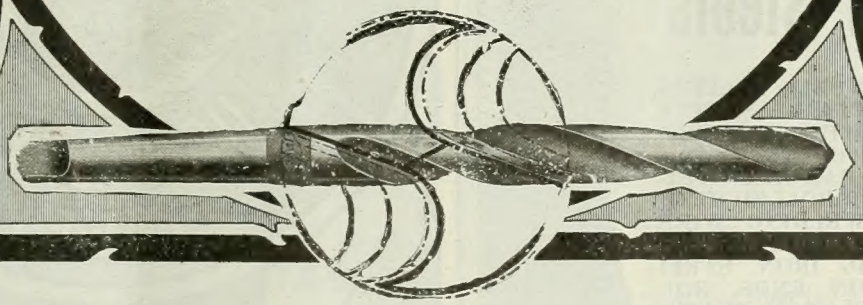
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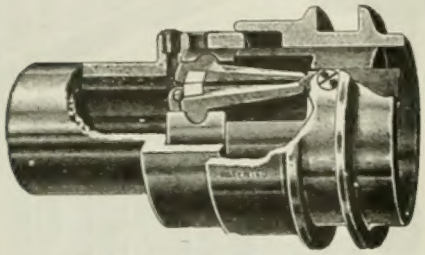
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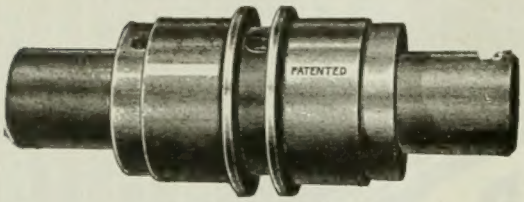
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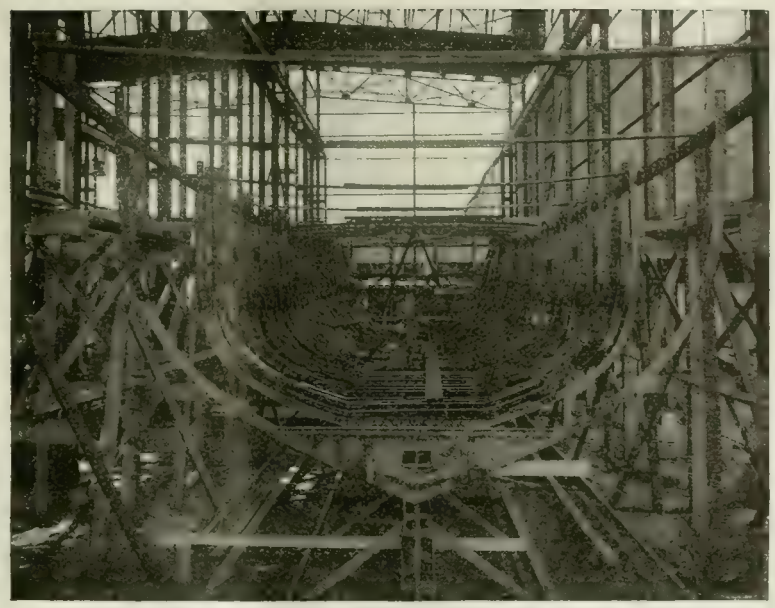
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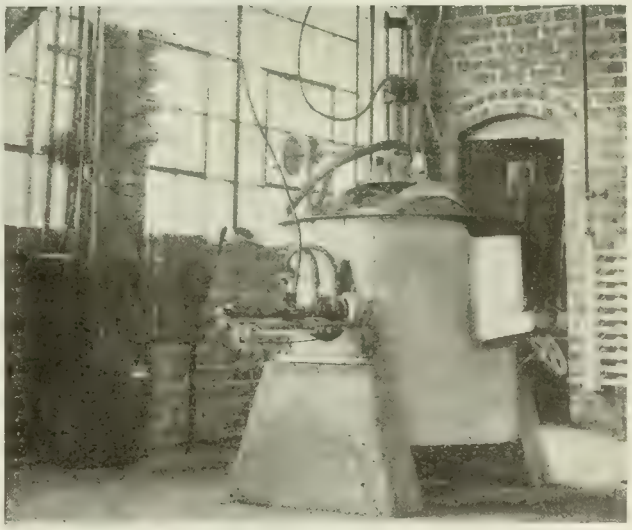
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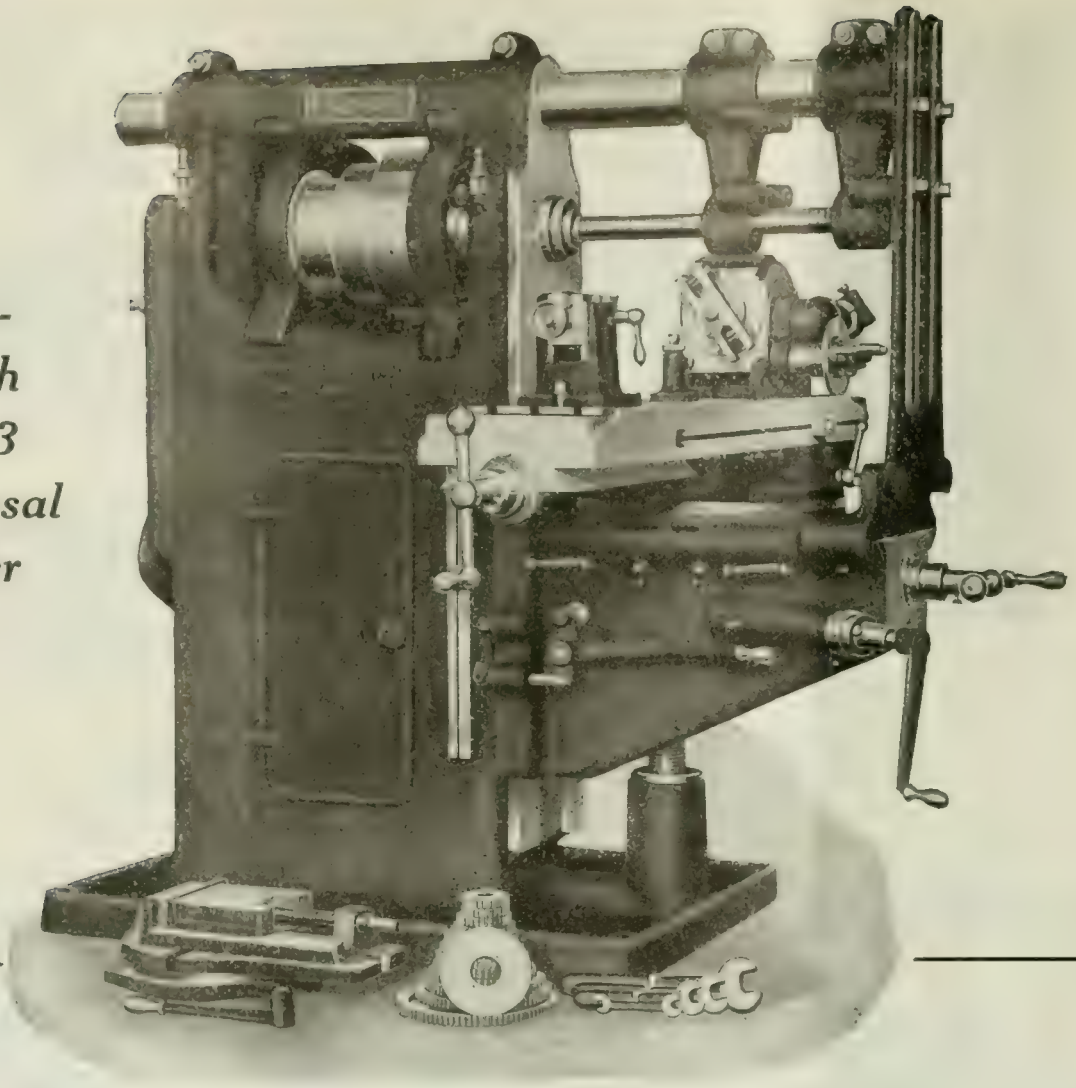
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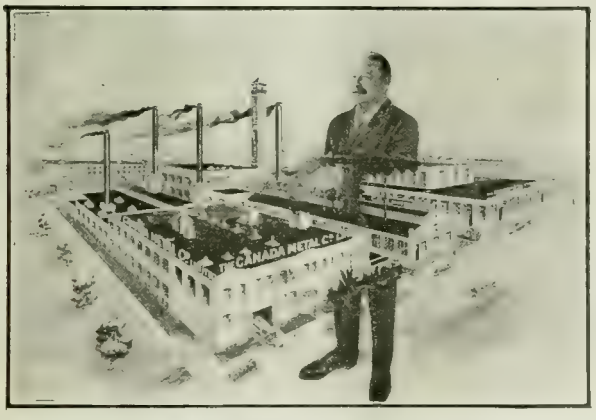
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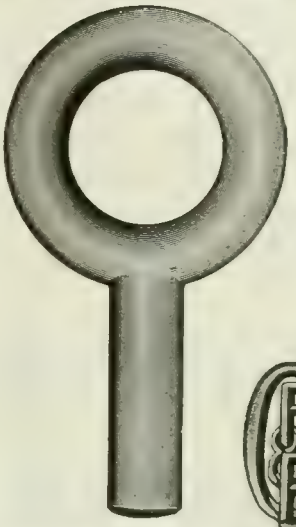
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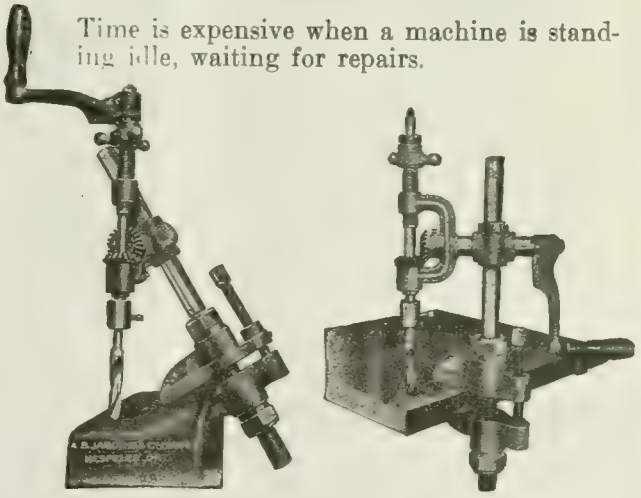
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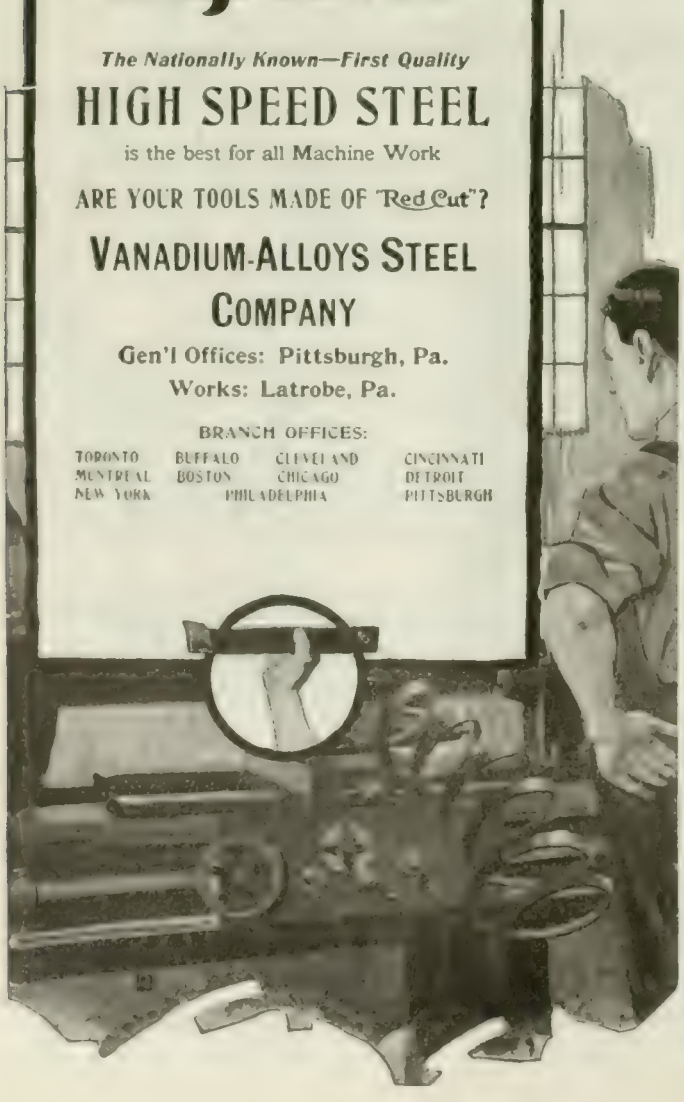
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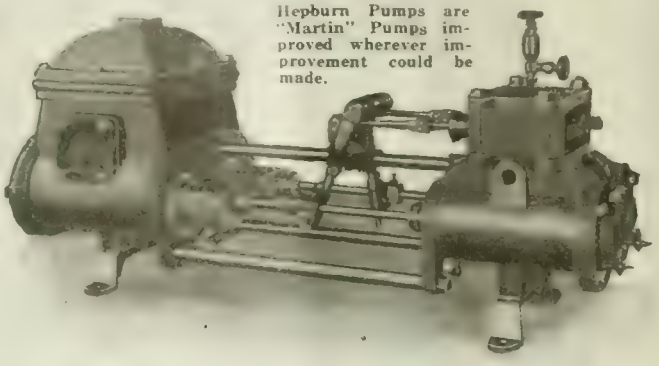
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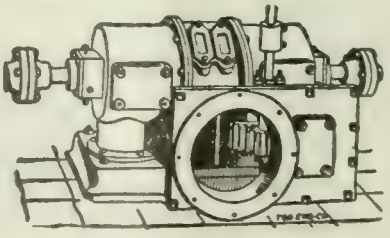
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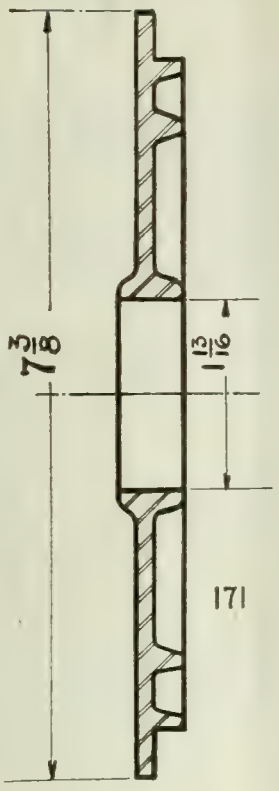
Can supply complete equipment, including flume, turbine and power transmission.

Stock of standard vertical shaft Little Giant Turbines on hand for prompt shipment.

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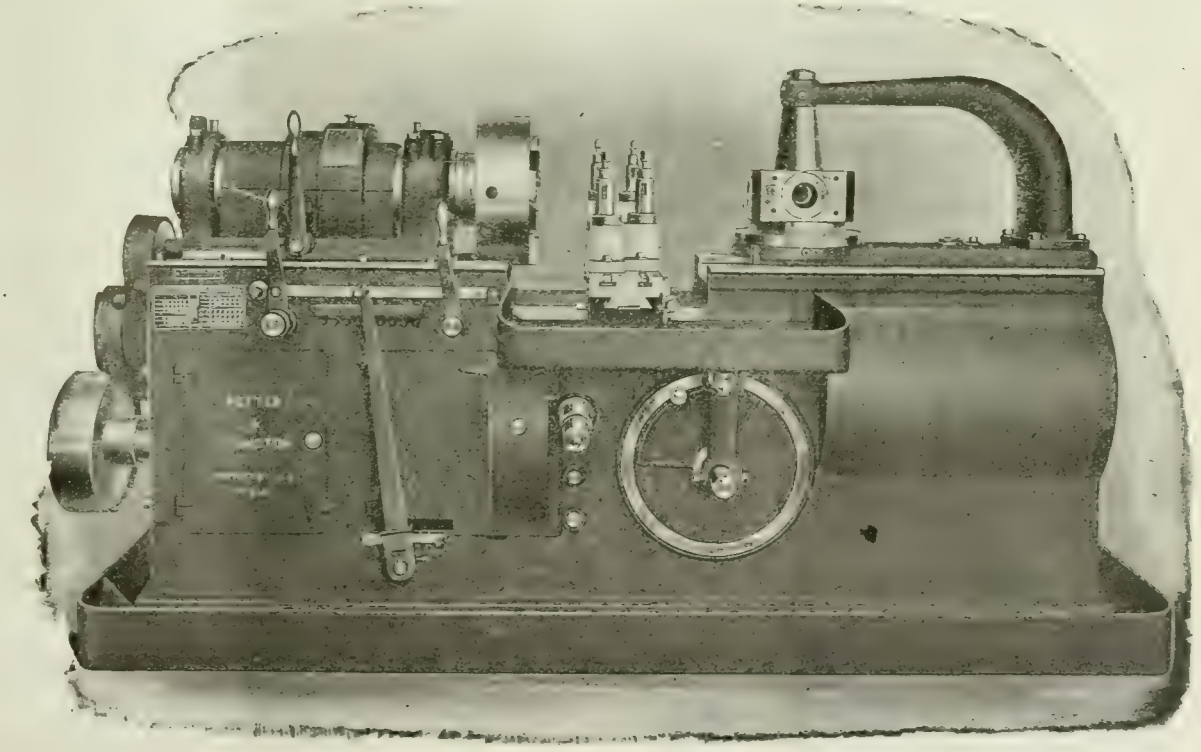
Have you ever thought that there may be a better way of machining your castings and forgings than with turret lathes, each of which requires the constant attention of an operator?

There is a better way and we are glad to give it to you.

The better way is handling this class of work in POTTER & JOHNSTON MANUFACTURING AUTOMATIC where one operator attends to as many as six machines.

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Engineering Aspects

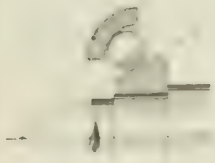


Fig. 1

OF the early history of ball bearings it is necessary to say but little. The fact that a weight could be moved with little effort on balls or rollers was known before the times of Archimedes or the Pyramids, but to find durable rolling members was another matter. As compared with a round bar turning in a wood, bronze, or cast iron sleeve, the high cost of even the simplest anti-friction bearing deterred efforts in that direction till the bicycle came.



Fig. 2

Of the technical features of early ball bearings, the following were prominent:

1. Adjustability. Intended to avoid costly accuracy in fitting, to facilitate assembling and to compensate for then seemingly inevitable wear.

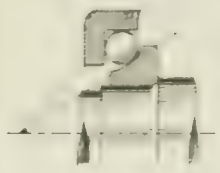


Fig. 3

2. Load Carried, not in the line of contacts, but at an angle thereto. This resulted necessarily from the adjustable feature.

3. Materials. Occasionally tool steel, but more often mild steel, case-hardened.

4. Construction. Accurate according to the standards of the time, but liable to vary one or several thousandths of an inch from true form in both balls and races. No separators used between the balls.

5. Finish. Balls and races ground passably smooth, and left to roll themselves to a true finish if they would.

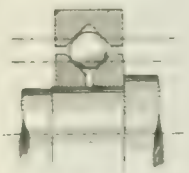
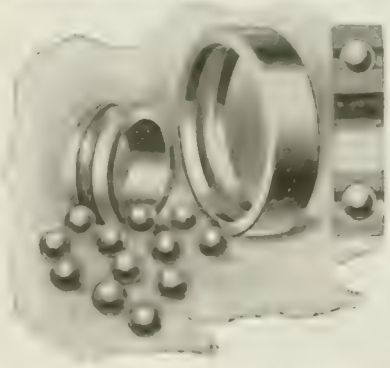


Fig. 4

6. Protection and Lubrication. No special provision made either to exclude dirt or to retain oil.

To the ball bearings expert of to-day these characteristics seem absolutely farcical; yet a dozen years ago no one could have said with authority that they were not as good as any others. Nevertheless, it is easy to-day to point out the defect in each.

MONARCH SERIES CONRAD PATENT



Deep Grooved Rigid Type SKF Bearing

The two cuts shown represent the last word in Radial Ball

No. 1 of a Series of Technical

CANADIAN SKF

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of Early Ball Bearings

The rise of the bicycle, and the need for conserving the very limited energy of its human motor, brought forth numerous types of two, three and four point ball bearings, of cup and cone and other types; and for very light service these types did well. Some of them are illustrated in the marginal sketches. All are familiar; all share certain technical features in common; all are to-day distrusted by reason of their failure to endure the heavy loads and high speeds demanded in serious commercial work.

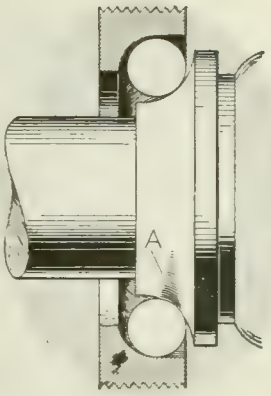


Fig. 5

1. Adjustability. No adjustment which acts alike for worn and unworn portions of a cup or cone, or which shifts the cup or cone at an angle to its line of wear, can compensate correctly. It merely shifts the path of contact, and the then highly localized pressure soon breaks down the new path and makes a bad matter worse. Not even a new bearing should ordinarily be adjustable, for the average user sets it either too loose—which compels one or two balls to take all the load —or too tight, which crushes balls and races.

2. Carrying the Load at an angle to its natural direction augments the pressures sustained by the balls. With a rational design, the line of contacts is as nearly as possible the line of applied pressure.

3. Materials. Unless the ball or race is homogeneous clear through, it will both compress and wear unevenly. Aside from that, the steels of twelve years ago were not good enough for good ball bearings; they were either too soft or too brittle.

4. As the balls and races are but slightly compressible, they will not distribute the load evenly unless formed with extreme accuracy. For balls, one ten-thousandth of an inch is about the limit of permissible variation.

5. Even the highest polish, under the microscope, is a mass of scratches. Only the "high spots" take the load, and if these are not fairly smooth they necessarily wear down. Only a very rough ball wears smoother, however; in general, the end of the first surface is the end of the ball's usefulness.

6. Dirt and Oil. Dirt ruins a ball bearing by grinding away the first polish on which durability largely depends. Oil is necessary, both for minor lubrication and to prevent rust. If dirt is kept out and oil (or grease) is kept in, the lubricant will last for months without being even discolored.

Elementary as these facts seem, it took years of time and a veritable fortune in experimental research to establish them fully, and to point the way to a genuinely durable type of ball bearing. Yet when that was done the results seemed, by comparison with the early failures, almost miraculous.

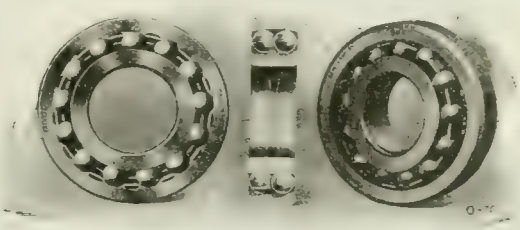
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Typical S K F Radial Bearing shown in normal position in cross section and in deflected position

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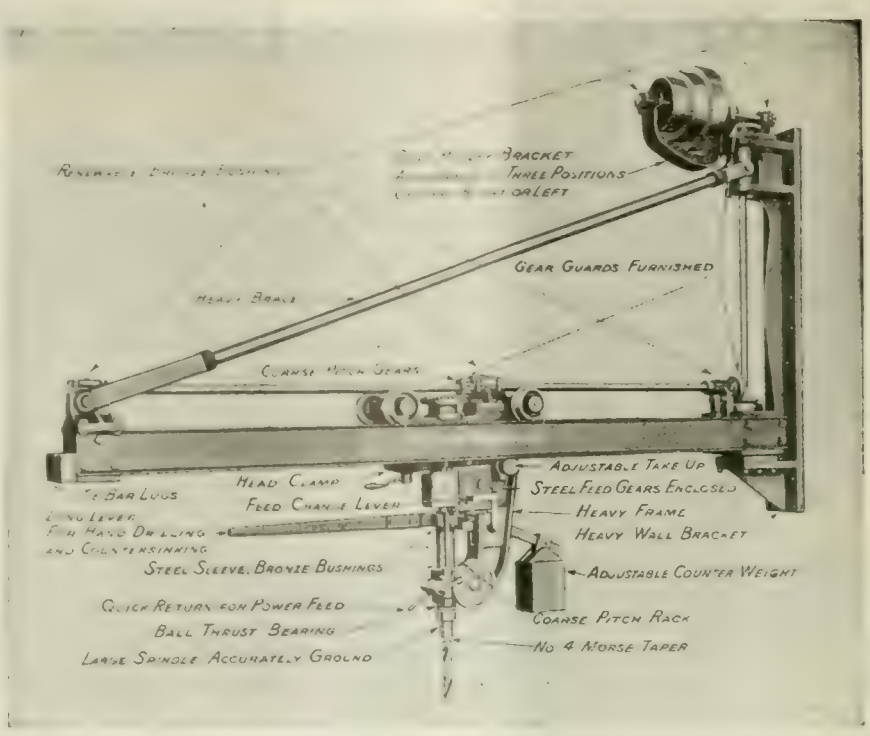
Here's a real machine tool in the wall radial drilling line for your consideration. Listen to this—the [illegible] materials throughout, and the workmanship is beyond criticism. It is designed with the particular idea of maximum production, at a minimum operating expense. Entire control within easy reach makes the operators "boosters" for these machines. You can keep the dollars that may be slipping away on your wall radial drilling propositions in your pocket by the installation of this machine.

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MADE IN FOUR STANDARD SIZES.

Rated size	Drills to centre of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

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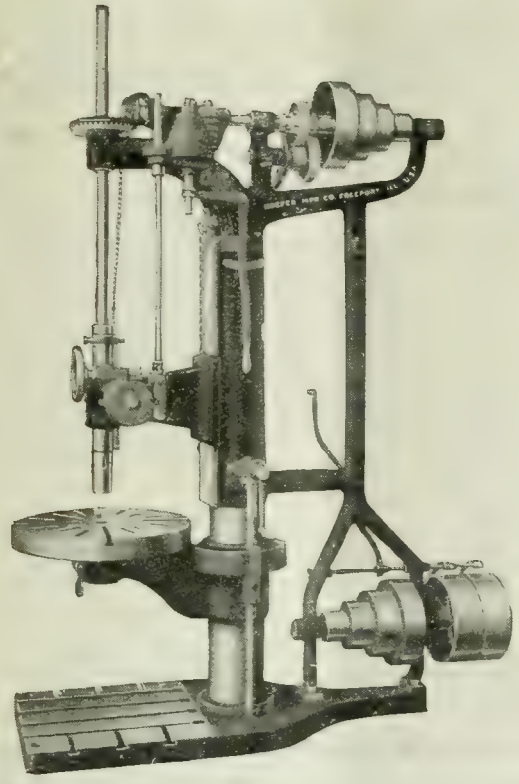
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About Construction

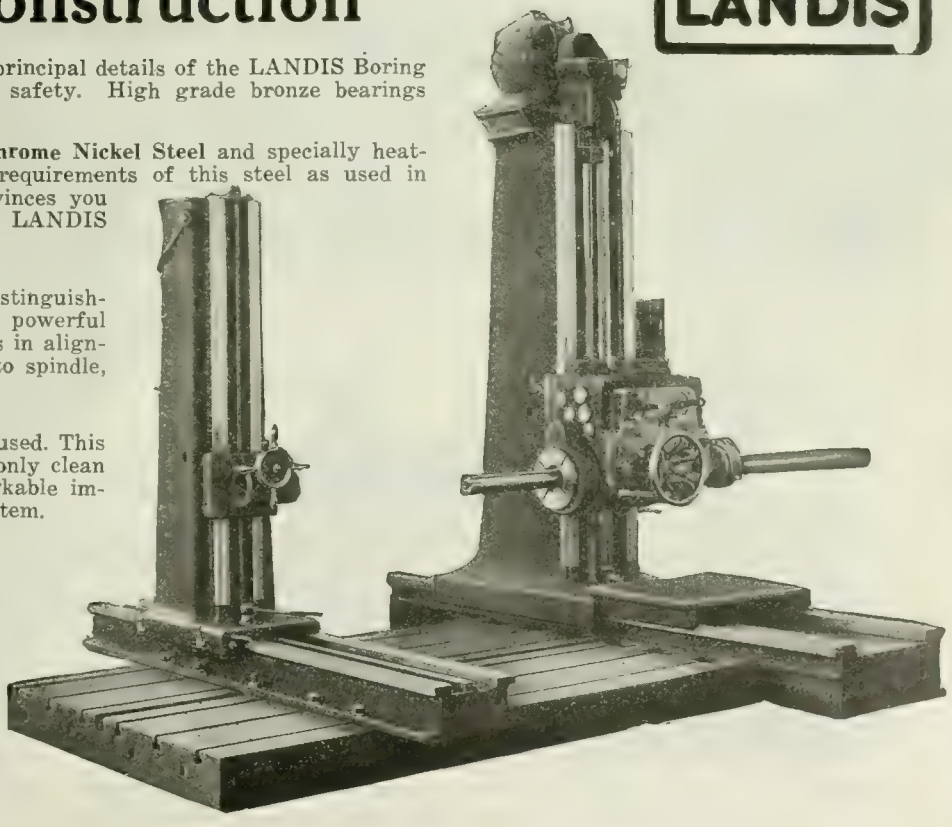
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Unusually heavy construction of principal details of the LANDIS Boring Machine increases the factor of safety. High grade bronze bearings insure long life and accuracy.

Gears and shafts are made of **Chrome Nickel Steel** and specially heat-treated The extremely severe requirements of this steel as used in gear shifts for automobiles, convinces you of its efficiency and strength in LANDIS gears.

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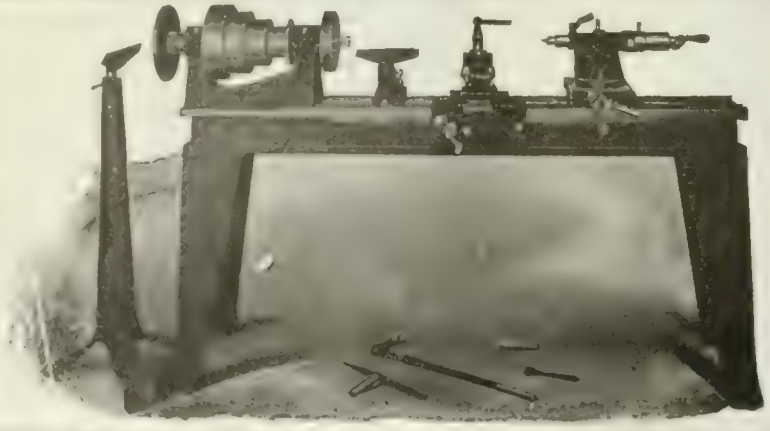
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UNEQUALED IN QUALITY ANY SIZE OR LENGTH

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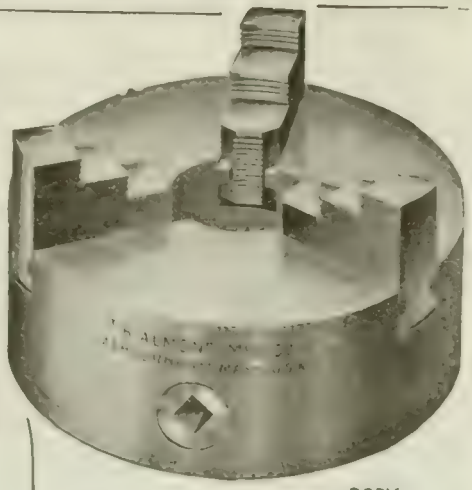


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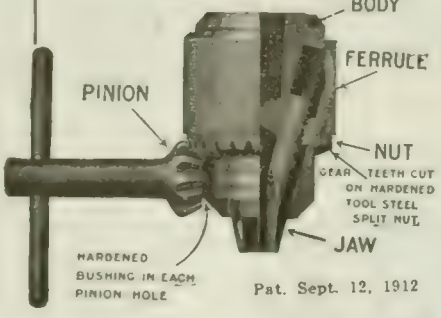
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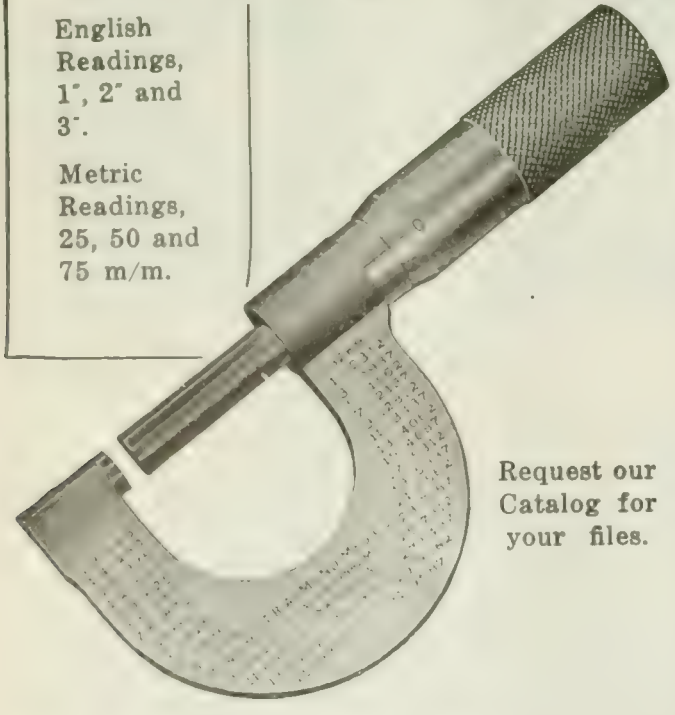


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Years of experience in using our tools has convinced manufacturers that the word "Cushman" stamped upon a chuck is a guarantee of its quality and efficiency.

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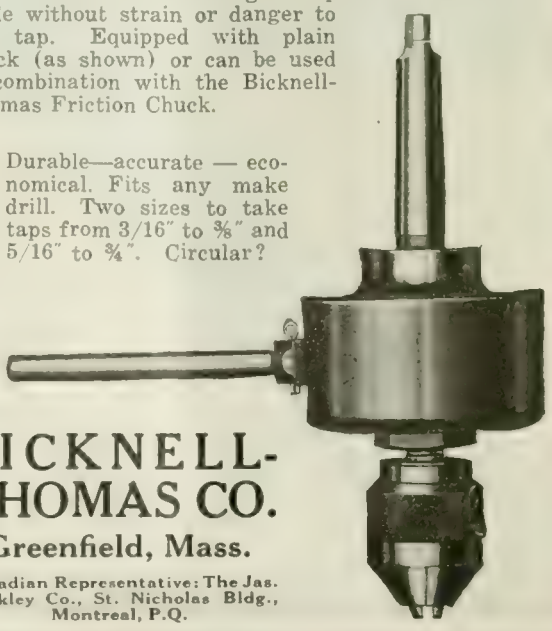


THE BICKNELL-THOMAS TAPPING ATTACHMENT

Speeds the Work—Saves the Taps

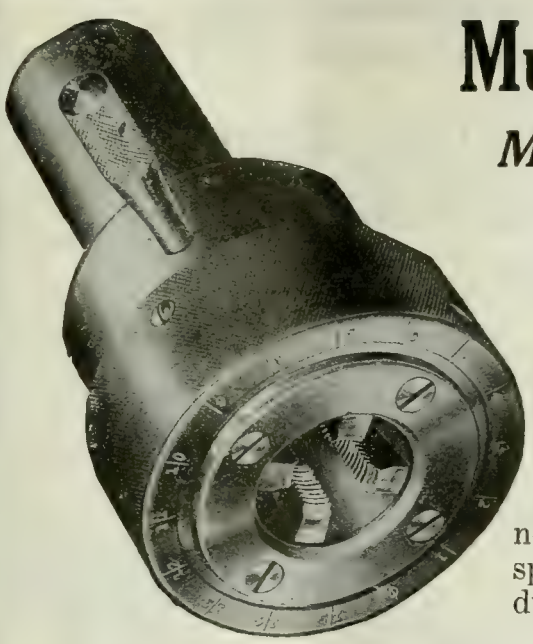
This Tapping Attachment withdraws the tap from the work without reversing the spindle. Reverse is made without strain or danger to the tap. Equipped with plain chuck (as shown) or can be used in combination with the Bicknell-Thomas Friction Chuck.

Durable—accurate — economical. Fits any make drill. Two sizes to take taps from 3/16" to ⅜" and 5/16" to ¾". Circular?



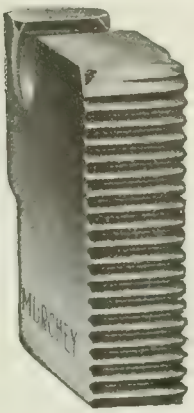
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Greenfield, Mass.

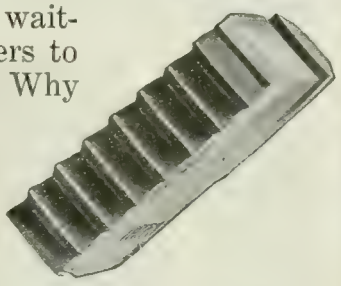
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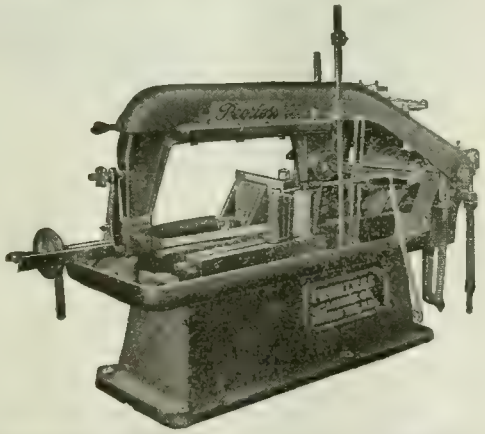
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The Peerless has established a new standard of production in so many plants that we are ready to ship one at our expense and risk, if you agree to give it a thorough test. A trial like this often results in our selling from 1 to 10 machines.

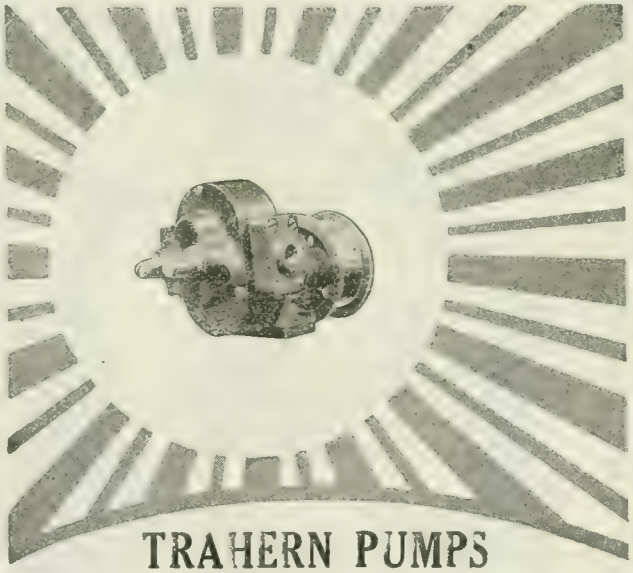
The Balance Lift of the Peerless

automatically raises the blade for the return stroke. This greatly prolongs the life of the blades, economizes power, and increases production. There are more good features which we shall be glad to acquaint you with.

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We positively guarantee that our pumps will deliver all the coolant that can be forced through the discharge opening, according to the size of the pump used, while operating from 300 to 500 R.P.M. A centrifugal pump delivering the same sized stream of lubricant must operate at a speed of at least 1000 R.P.M. This excessive rate of speed necessarily results in a short lived pump.

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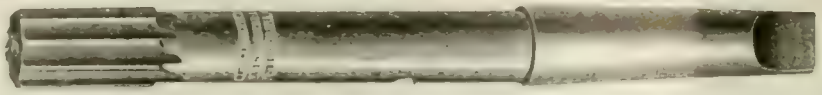
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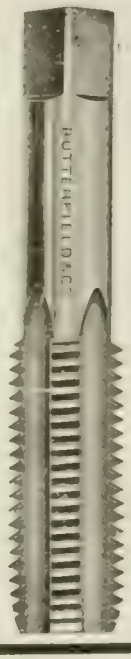
Taps, Dies, Reamers, Drills, Milling Cutters

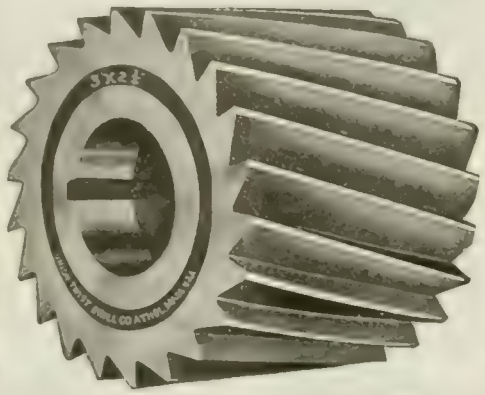
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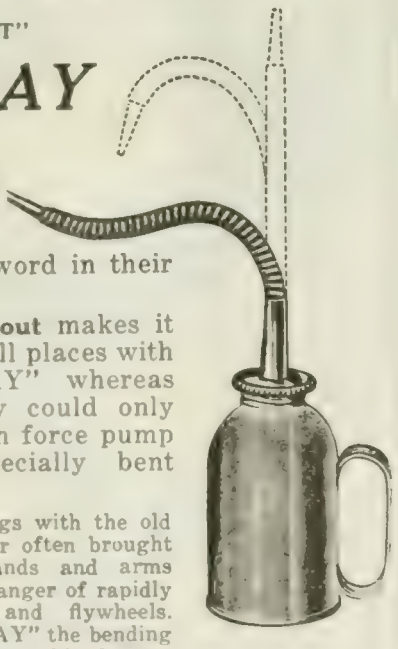
14

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ALL-WAY

RAILROAD

OILERS



are the latest word in their line.

The **flexible spout** makes it possible to oil all places with one "ALL-WAY" whereas previously they could only be reached with force pump cans with specially bent spouts.

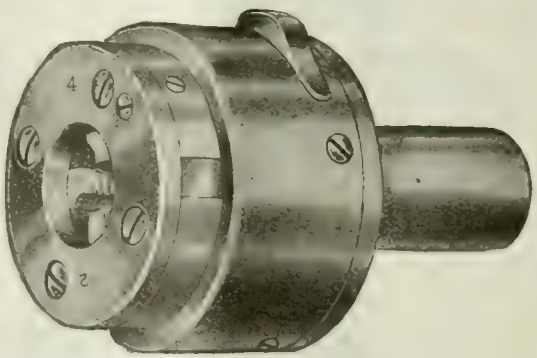
Lubricating bearings with the old straight spout oiler often brought the engineer's hands and arms very close to the danger of rapidly revolving gears and flywheels. With the "ALL-WAY" the bending of the spout removes this danger.

Sizes No. 4, 1 pint—10 in. spout. No. 5, 1 quart—11 in. spout.

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The H. & G. illustrated is an automatic, self-opening Die Head designed especially for use on Gridley and National Acme Multiple Spindle Screw Machines and others that use the die in a revolving position. The four sizes of this Head cut up to 9/16", 1", 1¼" and 1½".

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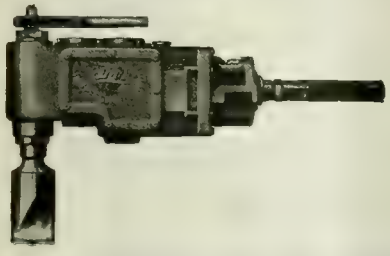
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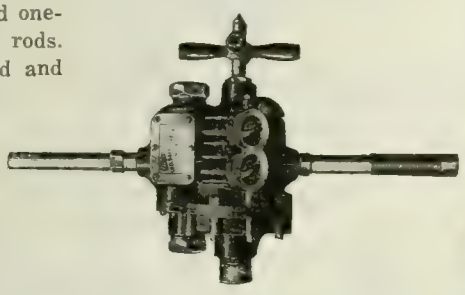
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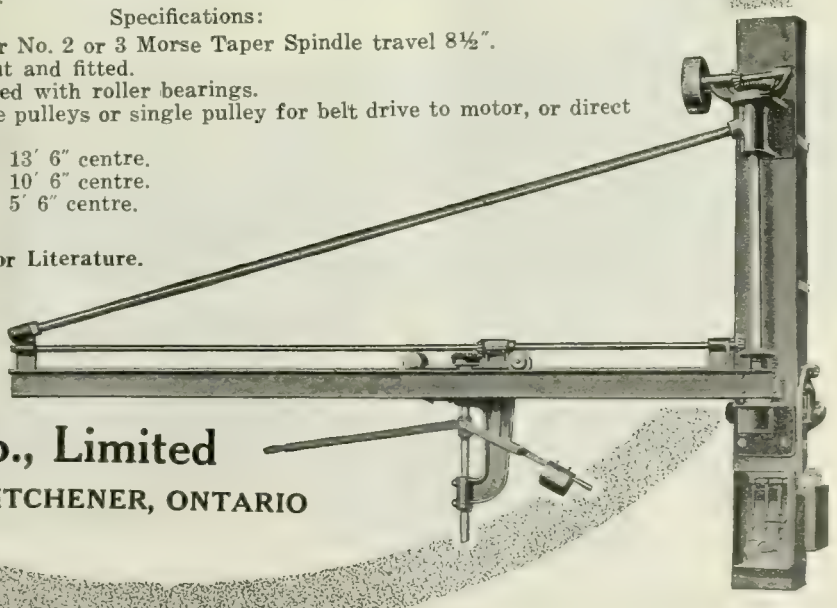
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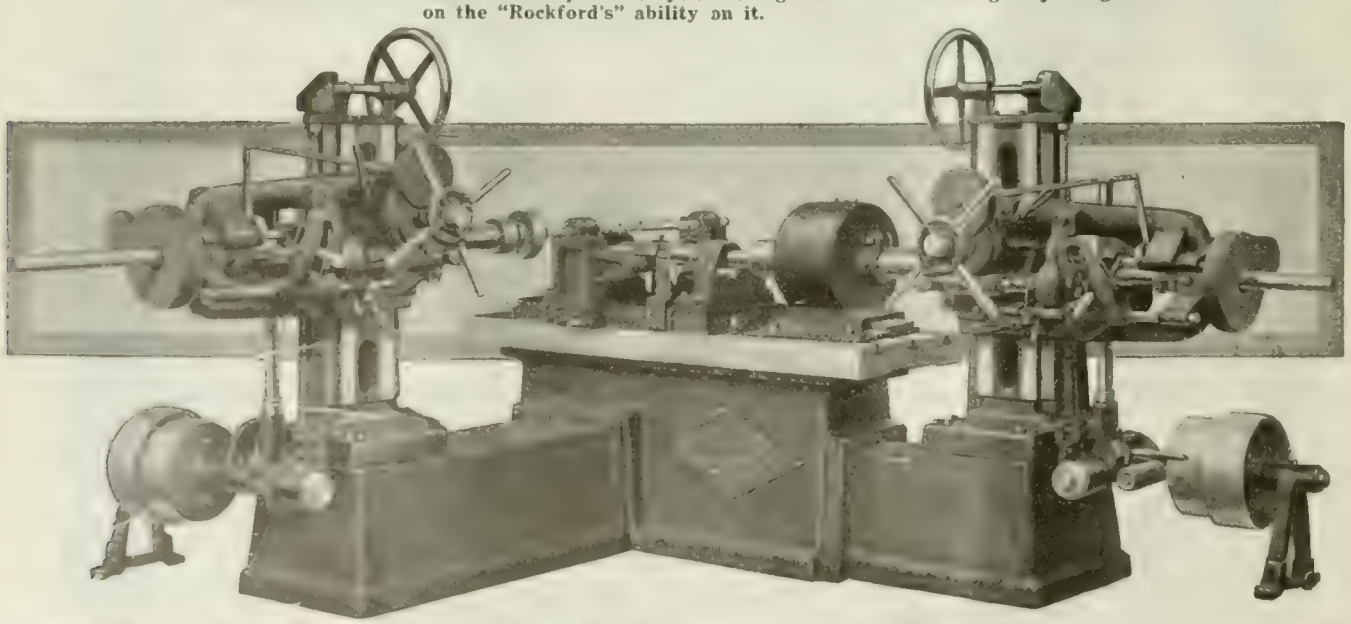
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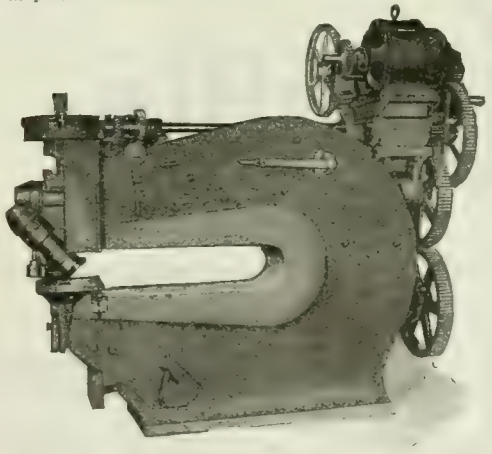
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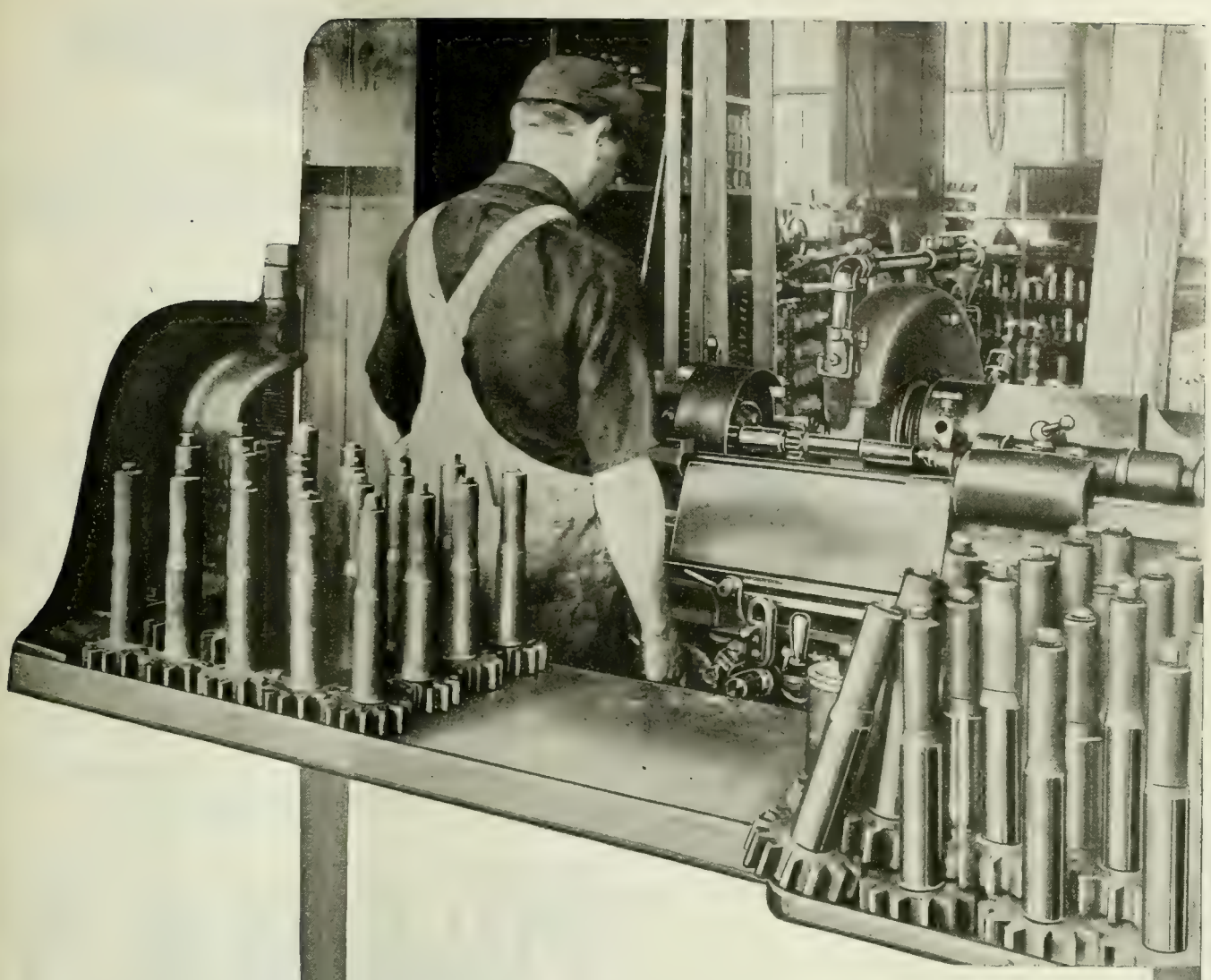
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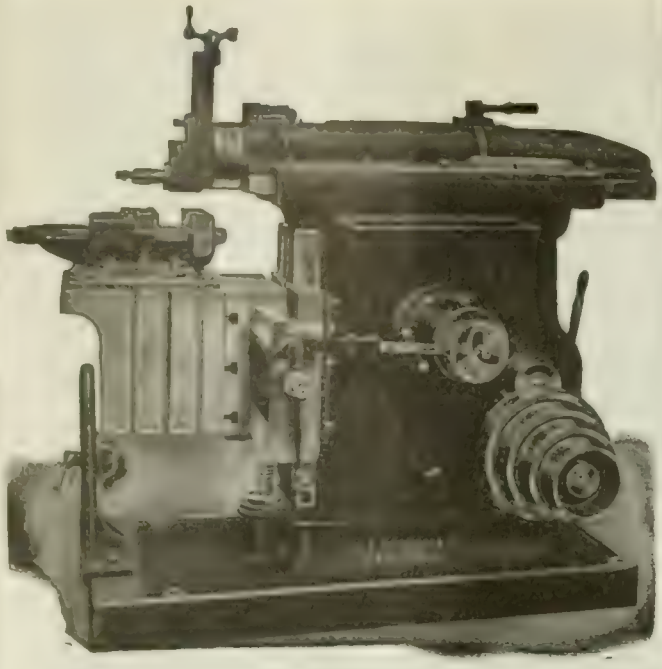
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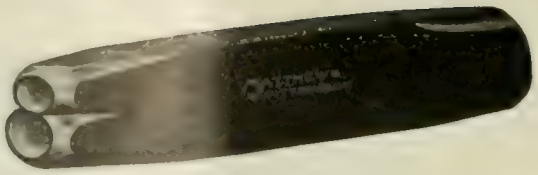
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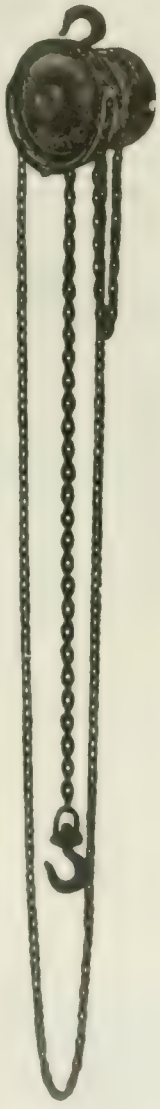
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MANUFACTURING NEWS

Vol. XXI. No. 10. September 11, 1919

Using Edging Rolls in Breakdown Emergency

Mill Managers as a Rule Aim to Keep Their Production Up to a Maximum. Herein is Described the Use of Edging Rolls as a Help to Quick Shipments

By W. S. STANDIFORD

IN these days of efficiency methods there is nothing more annoying to mill managers than to have a roll break during the rolling of an order for iron or steel bars, which are so essential to the construction of various machines, when a contract between the manufacturer and consumer requires delivery of the bars to the latter at a specified time. The usual method of procedure adopted by mill managers is to order another roll cast at a foundry, and when it arrives, work their roll turners night and day until it is finished, the rolling of the bars being then resumed. The employment of edging rolls in quickly filling orders when breakdowns occur seems to be little known t mill managers, yet the us of such rolls allows of fil ing the order very prompt ly and on time, the onl delay being caused by th roller in the time taken i changing the rolls, whic is very small.

As it is the aim of ever mill manager to keep hi deliveries of bars up t their maximum output, th use of edging rolls to en able quick shipments to be made, not only benefits the rolling mill owners, but passes it along to machine shops and others in different lines who use enormous quantities of iron and steel bars. These rolls are also a very valuable asset to any mill doing jobbing work, to fill orders for bars in large or small quantities, in widths of which there is only a small demand and for which it would not pay to turn a new set of rolls to make the sizes desired. As an example: Suppose that a mill had an order for flat bars of iron 2 1-32 of an inch wide by ⅜ of an inch thick, and had no rolls to make them in. The roller would simply put in the housing rolls that contained a 2⅛ inch pass for making bar iron or steel, also the edging rolls and a set of planishing rolls or "bull heads" as they are termed in rolling mill vernacular. The method of procedure adopted by the roller, is, to first make an iron bar in his flat rolls 2½ inches wide by 7-13 of an inch thick, which is 1-16 of an inch thicker than the desired thickness of the finished bar. Some rollers make the bar

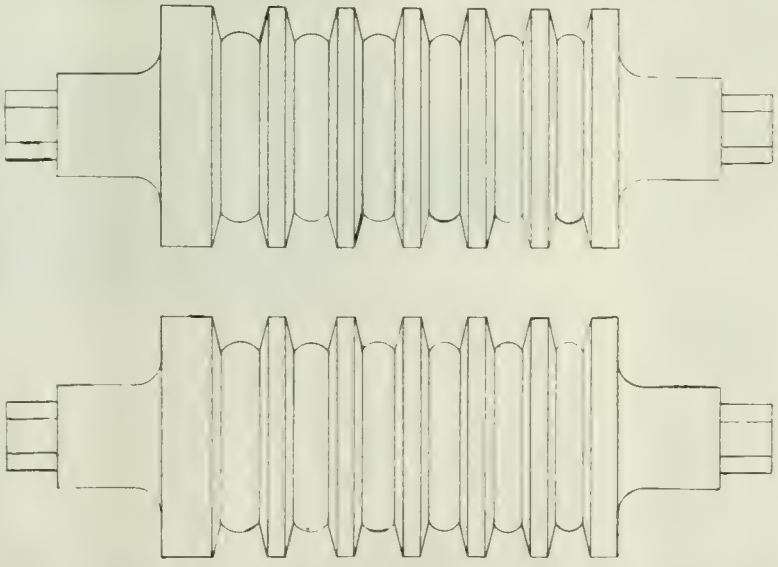


FIG. 1 SHOWS A SET OF EDGING ROLLS FOR EDGING SMALL FLAT BARS ON A GUIDE MILL. THE USE OF THESE ROLLS ENABLES ORDERS FOR IRON AND STEEL BARS TO BE DELIVERED PROMPTLY.

1/8 of an inch thicker so as to fill the edging pass out more.

Either system of handling the rolls will make good bars, the advantage being with the 7-16 of an inch one as it does not wear out the edging roll grooves or the surfaces of the planishers too quickly. As the red hot bar comes from the finishing pass in the flat rolls, it is inserted edgewise into the 7-16 inch pass in the edging rolls, the latter having been set so that the distance between the deepest corners in the pass will measure —allowing for shrinkage of the bar when cold—2 1-16 inches. In some cases there will have to be some slight variations made from these sizes, owing to the temperature at which the metal is rolled, speed of the rolls, quality of the metal in the bars made, in most cases they being made out of scrap iron which nowadays contains anything from Norway iron to tool steel. From the edging rolls, the bar next goes to the planishers, which have been set a few thousandths of an inch over ⅜ of an inch.

All of the above conditions have a direct influence on the size of the bar when cold. The best method of using edging rolls is to set them at the estimated height, allowing for the bars' shrinkage when cold, and then run a short hot "trial bar" through them. It can then be seen whether the rolls have to be raised or lowered slightly by means of the housings screws. At any rate, the variation from the sizes given will only amount to a few thousandths of an inch in the raising or lowering of the rolls.

Another use in which edging rolls can be used to advantage is as follows: It is well-known fact among rolling mill managers and superintendents that rolls for making flat bars generally wear out wider at the sides long before the passes by wear and turning of the rolls get so small that they have to be discarded as useless and new ones turned. When this class of rolls are worn so that the passes are 1-16 of an inch wider at the sides and enlarges, so that they make

a fin on the bar at the joints between the tongue roll in a two-high set, these rolls, although making a bar wider than the desired size, can, by the aid of the edgers and planishers, make perfect bars to the exact size desired and thus save money for any company.

It will readily be seen the important part these rolls play in saving money for rolling mill owners, they being of especial value in these days of efficiency in production. Having placed before the readers of this magazine the practical advantages accruing through the use of these rolls, I will now take up the constructional details of edging rolls. The rolls depicted in Fig. 1 are a set for edging small flat bars on a guide mill, and they contain the following passes: ¼, 5-16, ⅜, 7-16, 9-16, and 11-16 inch wide grooves, it being remembered that 1-16 of an inch is allowed for straightening of the sides and planishing to the required thickness of the bars, which for the above passes as 3-16, ¼, 5-16, ⅜, ½ and ⅝ of an inch. The width of the bars made is controlled by the amount of up and down space that the housing screws allow, and also the diameters of the rolls. In regard to the diameters and lengths of the rolls, there seems to be no standard lengths, each mill owner having his own ideas in regard to it.

The rolls in this set are 20 inches long (not including necks and wobblers) and 10 inches in diameter. Some rolls have duplicate passes of the various sizes in order to make the rolls last longer without dressing. Others contain the usual number of grooves and have a blank space for the insertion of other sizes of passes. In some cases the blank space is used for planishing purposes. But the latter is not an economical one for the reason that the planishing surfaces get roughened by use long before the edging passes need dressing in the lathe. It is necessary in roll dressing to take the same amount of metal off of all passes so as to keep their proportions the same as when they were first turned. By this it is not meant that the rolls must be the same in diameter as when they were first made—as by wear and turning they are continually getting smaller. What is meant is, that the diameters in the bottom of each pass have the same proportionate depth to the diameters of the collars or barrel of the rolls when they were new. In dressing rolls, if 1-32 of an inch were taken off of the surface and passes of the top roll, the same amount should be removed from the bottom one—or if the rolls are three high, from all of them. The top roll of the edging set (which are most always two-high) should be ⅛ of an inch larger in diameter than the bottom one, the faster peripheral speed of the top roll then throws the bar down and away from the pass, delivering it straight, thus destroying the tendency of the bar to fly upwards, pass over the top of the top roll and meet the rear part of the oncoming bar, which, in the case of iron being made, becomes welded to it. This is technically called "a collar," and it forms one of the most exasperating and costly delays which a mill can have, frequently the sudden stop resulting in the engine breaking down or the journals of the wobblers of the rolls being twisted off.

On the other hand, should a top roll be 1 inch larger in diameter than the bottom one, a "backlash" will result owing to the peripheral speed of the surface of the top roll being much greater than that of the bottom one. This results in flat bars having a corrugated shape, they also being uneven in gauge. Backlash is also very hard on the rolls and machinery, it frequently causing damage. In all cases, especially in the designing of rolls for making thin shapes and sections such as angles having an unequal length of side, the position of the pass has to be carefully placed in the rolls if bars without bent and torn edges are to be secured. Rolls for making large round bars do not require the top roll to be larger than the bottom one, the force of gravity ensuring that the bar delivers in a straight line. By referring to the edging roll photograph depicted in Fig. 1, it will be noticed that the bottoms of the passes are rounded. This is done so that the finished bar will have straight sides, as otherwise the bull heads bulge the centre portions of the sides out. By having the bar of

of ⅜ of an inch, all being equal in depth. Many roll designers and roll turners will disapprove of having all of the edging grooves of a uniform depth; the usual practice in this respect being to make the smaller ones such as the ¼ inch passes shallower than the ⅝ of an inch and smaller ones. From an efficiency standpoint, the writer as a practical roll designer has found out by experience, that it pays to make them all of equal depth, as the roller can work with greater speed and efficiency. An example to illustrate this point will be given. Suppose that a roller has to make flat iron bars 1¼ inches wide by ¼ of an inch thick, and that rolls containing a 1⅜ inch wide pass are to be used to make the 1¼ inch bars. It frequently happens that the roller during his day's work has orders calling for bars of the same width, but varying in thickness. Now, by turning all of the passes to the same depth the roller has only to set his rolls for the one pass, and the other ones will have the same widths if the roll turning has been accurately done. The roller will thus be enabled to get the work out far more quickly than if he has to stop and lower or raise his rolls, using trial bars in each case to get his sizes

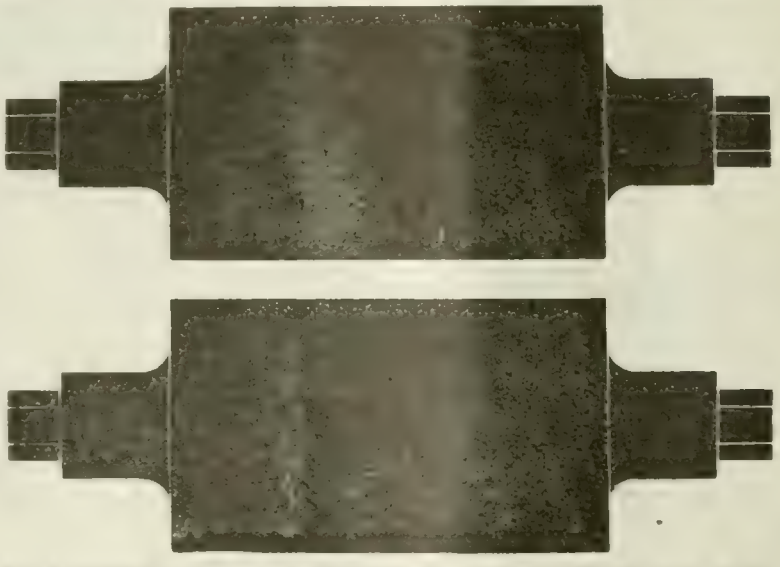


FIG. 2. DEPICTS THE PLANISHING ROLLS FOR STRAIGHTENING THE SIDES OF THE BARS AND ALSO FOR SMOOTHING THE TOP SURFACES. THE USE OF BOTH SETS OF ROLLS SAVES MONEY FOR MILL OWNERS.

sides of each bar concave as they leave the edging groove they straighten up nicely in going through the planishers. In order to make the photograph show the convexity of the bottom of the edging passes clearly, the curves are shown purposely exaggerated, as in actual practice, for the sizes of the grooves under discussion, they would be nearly straight; a roundness of only eight 1-1,000ths of an inch being required between the corners and the highest part in the centre of each pass. In designing edging grooves for making flat bars of iron or steel of one inch and over in thickness it is the usual practice to allow more convexity of surface in each different size of groove.

The collars of the passes of the small edging rolls shown in the illustration have a taper of 6 degrees and a depth for bars having the same width, but differing in thickness.

It is the practice of up-to-date mill managers to so group their orders that the roller, when working on different thicknesses of bars, will have no more changing of rolls than is absolutely necessary, as the time consumed in changing and adjusting the rolls to make various widths of iron or steel bars delays production and costs money. The planishers or bull heads shown in Fig. 2 are generally made out of chilled cast iron as this metal has long-wearing qualities. Whenever possible it is best to have a set of bull heads having as long a body length as can be gotten into the housings, sets of rolls with lengths of 18 or 20 inches, lasting long before needing dressing in the lathe. In using these rolls, when one portion gets rough

the roller shifts over to a smooth part, hence the advisability of using rolls having a long body length, as it will be quite a while before they require dressing.

The use of chilled iron for planishing rolls has one drawback as contrasted with those made out of ordinary hard cast iron, and that is, whenever a jam occurs with a bar in chilled iron rolls, the metal is compressed, forming what is technically termed a "burnt spot," which vary in depth from 1-32 to ⅛ of an inch. Turning out a burnt spot is one of the most exasperating and tedious pieces of work that a roll turner has to contend with. This is due to the fact that chilled cast iron is very nearly as hard as the tool used to turn it, and when the metal is compressed it is rendered as hard as the metal in the tool. The result being that when the tool touches the burnt spot it slides over it, the edge of the tool breaking out at the same time, thus necessitating regrinding. The method adopted by the roll turner in turning out burnt spots is to resharpen the tool and take a light cut until he nears the hard spot, then he takes a very heavy cut so as to get under it and lift it out. The tool is then reground and the process repeated until it is turned out. The surface of the roll is then trued up with another tool. The roll turner, in doing this work, actually spends more time grinding the tool than is spent in the turning as the burnt spot shatters the edge each time it is used. It is hardly necessary to state that the workman does not stand in front of the lathe while cutting or breaking out these spots, as pieces of the spot and tool fly out with considerable force.

In handling of the edging and planishing rolls, the roller has to use judgment, if one set of rolls are smooth and the other is rough. Thus, if the finishing flat roll passes are smooth and the edgers and planishers are rough, the finished bars will have a rough appearance. If the finishing flat roll passes are rough before the bars go into the edgers and planishers, the edging and planishing rolls being smooth, then the finished bar will be smooth. Should both the flat rolls and the planishers be smooth, while the edging rolls grooves are rough, then the finished bars would have smooth tops and bottoms and rough sides, as the edging rolls control this part of the bars. The foregoing shows that the roller continually has to use judgment in handling the rolls, as he can spoil the appearance of the best metal ever made by not attending to details.

Will Wait a While.—The threatened strike of railway shopmen in the United States has been held over for a time, according to a decision reached by the executive council of the American Federation of Labor. The wage increase offered by President Wilson was declared inadequate by a vote of 325,000 to 25,000, but the men agreed to leave action to the International officers. The executive decided not to put the vote in operation till the result of the Government's efforts to decrease the cost of living becomes apparent.

COST OF CUTTING TOOLS

From Machine Tool Review

IT is remarkable that any false ideas should prevail as to multiple tool machines being disadvantageous on the ground that cost of cutting tools used on them is higher than those used on single operation machine tools. This idea is not widely entertained, but is persistently revived, sometimes by capable men, who perhaps have not had time to reason it out thoroughly. The idea crops out in arguments in which comparisons are made between two classes of machines. In the course of these disputes items of cost, such as capital, tools, floor space, etc., are isolated for comparison as involved in the two methods. If the summing up of the totals of the items is neglected no useful conclusion can be reached. There is no sin or virtue, or profit or loss, in using more or less cost in one of these items. The point is which is the least costly method of doing a given quantity of work. Even on these broad lines it should first be considered whether the work really is equally good by either method. In fact, possible cost is not the sole consideration, although it is so important.

Assuming, however, that the two methods are equal in all things except cost of production, it is necessary to analyze cost under classified headings. We must expect, then, that as the methods are different the cost headings will differ and cannot be compared in classes one against the other. It is only the totals that tell. For example, in cutting tools. If old plant is used carbon steel tools may do as well as high speed steel in cases where the cheaper steel will cut as much as the machine will drive. But that will not be a general rule. In cases where it is true the tools will be less expensive but the cutting will be more expensive. If we leave out cost of steel and its relation to quantity of cutting, and consider only the time spent in sharpening to keep the tool fit for its work, it will not matter which type of machine it is on. If one tool is continuously cutting on a centre lathe as against, say, six tools on a multiple machine, then we may be asked to assume that each tool on the multiple machine cuts on an average only one-sixth part of the working day. That will not affect its "wear and tear" expense in the end. If other conditions are equal the tool on a single operation machine will be sharpened six times as often as on the multiple machine, but that is solely because we assume it to do six times as much work per day. If we allow that asumption, which we would not on its merits, it only means that by using single tool machines there will be less capital fixed in tool steel. If we consider capital, in comparing two methods of production, we must consider the total capital required to produce a given output and in relation to the wages cost of the output. These are old arguments, but still often misunderstood. In splitting up items of cost for separate comparison we may evade any real problem there is if we neglect to assemble the detail losses and gains, compare the totals, and show on which side the balance of advantage lies. The single machine method might be taunted with using six times the quantity of belts, countershafts, floor space, etc. Those would all be equally, or unequally, relevant, but no one of them would solve the problem.

It may be said generally that the multiple machine method leads to increased expenditure on cutting tools. A better stock of tools is kept, better skill and attention is given to dressing them, and concurrently with the increase of knowledge obtained finer and more costly tool materials are preferred. But all this results in lowering the total cost of production. If a six-tool machine is standing idle because one tool has failed the effect is to make a bad manager despair while a good manager applies his talents to overcoming the difficulty. The competent man it not going to give up good machines because he has bad tools. The fact, however, behind all this is that even where multiple machines are not used it would pay to give far better attention to and spend more money on the cutting tools.

DRIVING CHAIN MANUFACTURE

The leading British manufacturers of driving chains have resolved to form a permanent association of their interests in order to develop the trade on lines that will fully satisfy home requirements and enable them to compete abroad. The associated firms are the Alfred Appleby Chain Co., Ltd., Birmingham; Brampton Bros., Ltd., Birmingham; the Coventry Chain Co., Ltd., Coventry, and Hans Renold, Ltd., Manchester. These firms will work together in improving the quality of driving chains and gear, in promptly meeting the demands for quantities and in supplying technical and other information. They will also be able, by co-operation, to bring more efficient service to bear in securing to this country a proper share of foreign trade. Some of the immediate work in hand is: (1) To standardize chains, wheels, and chain wheel cutters; (2) To simplify matters by eliminating any redundant sizes which create expense and difficulty to the user without serving any useful purpose; (3) To provide for a large and rapid output so that new schemes can be carried out with the least delay; and (4) To systematize and develop technical knowledge both for manufacturing purposes and for use in applying chain drives. It is not many years since the conveyor chain and the bicycle chain were the only driving chains very widely used. With the development of exact manufacture much wider applications were tried, and the new difficulties which arose were dealt with in a way that created a separate and flourishing branch of manufacturing engineering. The association aims at retaining the position and extending it.

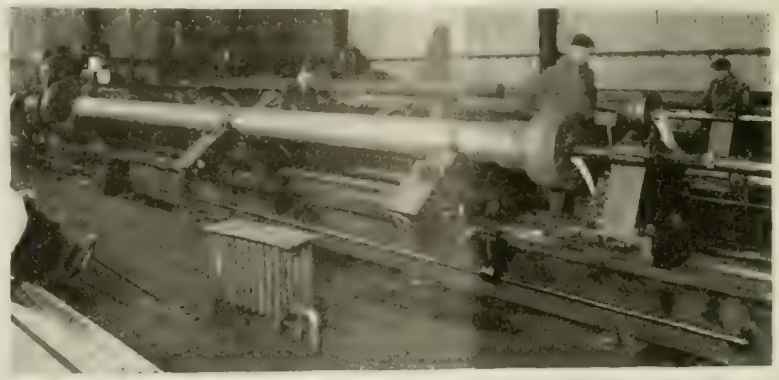
Goodyear Building at Regina. — A three-storey building will be erected by the McKay Construction Company, contractors, for the Goodyear Tire Co. The building will be used as offices and warehouses, and is estimated to cost $75,000.

Various Operations On Propeller Shafts

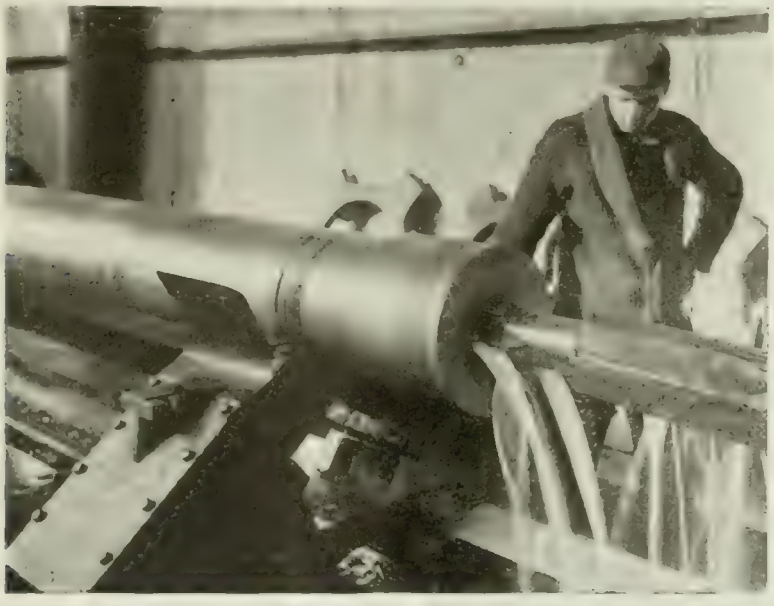
These Views Illustrate Interesting Work on Marine Shafts, Bored Out, Etc., on Special Large Hollow Boring Lathes. These Pictures Were Taken at the Plant of the Pollak Steel Company

By FRANK C. PERKINS

THE accompanying illustrations show the Pollak Steel Plant equipment at Cincinnati, Ohio, where steel axles and forgings are provided for locomotive and marine service. The equipment of the hammer shop for forging locomotive side rods and other parts is equipped with modern hammers, and in the press shop may be found several one thousand ton steam hydraulic presses with a battery of furnaces in the background. These presses are served by two overhead travelling cranes with special electrical turning devices. The large marine propeller shafts from the press are forged and delivered to the machine shop to be rough turned and



BATTERY OF LARGE HOLLOW BORING LATHES AT WORK, BORING LONG MARINE SHAFTS.

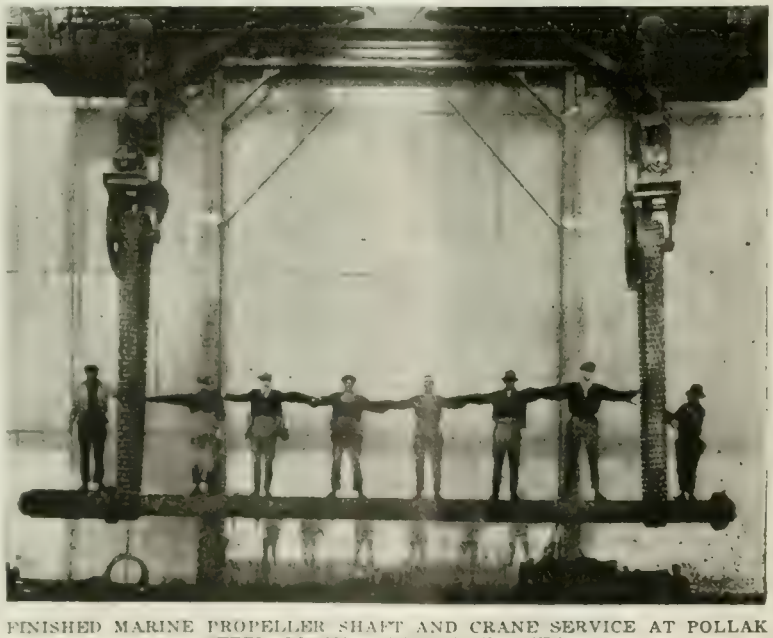


72 HOLLOW BORING LATHE BORING HOLE THROUGH SOLID MARINE PROPELLER SHAFT.

rough turned. The 72 ft. hollow boring lathe bores a large hole through the solid of a marine propeller shaft.

In the heat treating department there is a battery of vertical furnaces with large quenching tank to the right. To the right there is a battery of large car type annealing furnaces. All these furnaces are equipped with electrical devices for determining the heat temperatures, which is very important in the heat treating of steel. All the furnaces are controlled from a central station, which makes it possible to have uniform heat throughout. The large shaft is lowered into the furnace to be heated and then quenched in the quenching tank to the right. One of the most modern cooling systems is operated in connection with the oil quenching tanks. To obtain the highest efficiency in heat treating of steel the quenching fluid should be kept at a constant temperature. The quenching fluid is, therefore, circulated through a series of coils located under water in a 150,000 gallon reservoir. This department is equipped with cranes and conveyors, and is capable of taking care of forgings of every description of from one to one hundred thousand pounds. The marine propeller shafts of great length are bored in a battery of large hollow boring lathes

The work of the Pollak Steel Company dates back to the year 1865. The fifty-four years of practical experience together with constant application and concentration has done much toward the betterment of forged products of all kinds, such as steam and electric car and locomotive axles. In this plant are produced hollow bored special heat treated locomotive axles, as well as crank pins, connecting rods, cam shafts and side rods, also all kinds of forgings for railroads, marine forgings of every shape and description, forgings for every line of industry, sugar mills, machine tool builders, automobiles, tractors and machinery builders. The plant is equipped to handle anything in the forging line from one to one hundred thousand pounds.



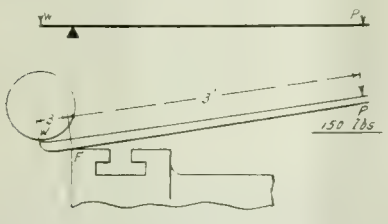
FINISHED MARINE PROPELLER SHAFT AND CRANE SERVICE AT POLLAK STEEL PLANT, CINCINNATI, OHIO.

Shop Arithmetic, Levers in Shop Practice

Eleventh of a Series in Practical Mathematics For the Mechanic and Those Learning the Machinist Trade—Leverage as Applied to Every-Day Shop Practice Forms the Present Lesson

By J. H. RODGERS

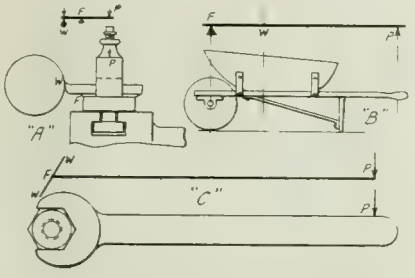
IN our last lesson the instruction dealt with a few practical applications of the simple lever. We will now consider, further, this subject of leverage as applied to every-day shop practice. A very common sight that one might see in the average machine shop is the use of a "tommy" bar for straightening shafting in the lathe. When a shaft is found out of true it is frequently the custom to use the bar and peen, and remove the kink while the shaft is held between the lathe centres—not the best practice we will admit, but if proper attention is given to details, light shafting may be effectively straightened by this method. Probably the way generally adopted is shown in the sketch below, where the shaft is revolved on the centres and the high side determined by the use of chalk. The lathe is stopped, turned by hand until the high spot is at the bottom, or point A, so that the point of the bar will be on the chalk mark, the heel B (fulcrum) resting on the edge of a tool or on the corner of the tool-post rest. The various factors can then be determined as shown in the skeleton sketch.



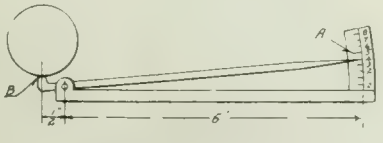
With a lever, as shown above, the resistance (weight) due to bending the shaft would be equal to the force applied at P (150 lbs.) multiplied by the length of the power arm (3 feet), divided by the length of the weight arm (3 inches), or:

$$\text{Resistance } W = \frac{150 \times 3 \times 12}{\frac{1}{4}} = 1800 \text{ lbs}$$

A few practical illustrations of the simple lever are here given; "A" shows a lathe tool in position, and emphasizes the importance of minimum overhang, to insure rigidity and prevent chatter. This rule holds good wherever cutting tools are used. "B" shows a loaded wheelbarrow and demonstrates the advantages of concentrating the load as near the wheel as conditions will permit. The weight, however, should be so placed that the power applied on the machine will be a lifting one, as better control is possible. "C" shows the lever when tightening a nut with a spanner. The solution in each case is calculated on the supposition that the force is applied in a perpendicular direction to that of the lever. In using a wrench, however, this condition will not always exist, but greatest efficiency is obtained when such is the case. When using a wrench on a nut it will be seen that the sides bear on the corners of the nut so that the resistance or weight arm will equal the radius of a circle, having the corner distance as the diameter.

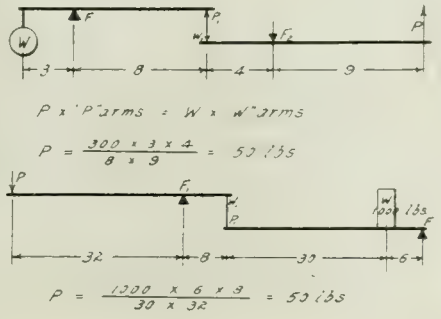


A little study and observation will enable anyone to analyze and simplify almost any mechanical application of the simple lever. The principle is not confined to the equalization of forces as levers are often used to obtain an increased or decreased motion of travel. An example of this kind is shown in the indicator below, the pointer showing a relative movement to that of the contact point, the value of such movement being determined by the corresponding lengths of the lever arms. Suppose that the graduations on the arc A of the indicator are divisions of 1-10 of an inch, and the variation between high and low, when testing a shaft, is found to be 3-10 of an inch; what is the eccentricity of the shaft or the movement of the contact point B, the lever lengths being as shown?

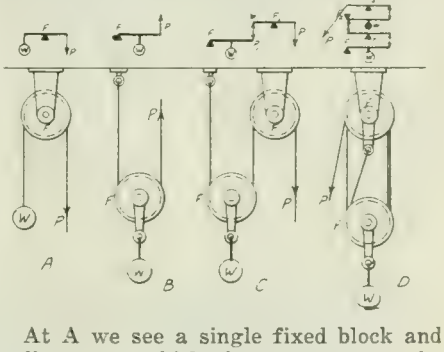


The eccentricity would then be .025, and to bring the shaft or disc central it would require to be moved .025 divided by 2, or .0125 of an inch.

It is not always possible, however, to obtain the results desired by the use of a simple lever, and very frequently it is necessary to combine two or more simple levers into what is termed a compound lever; the principle, nevertheless, remains unaltered. A skeleton drawing of two compound levers is here shown.

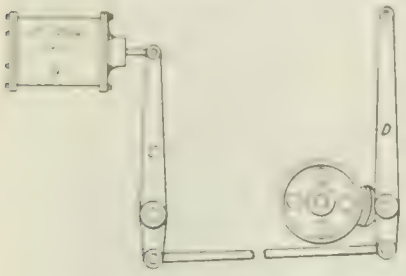


Apart from the levers generally used in weighing scales, the simple application as shown above will seldom be seen in practice. In almost every nook and corner of a machine shop a modified form of the lever may be found. Everyone is more or less familiar with the ordinary pulley, and it is here that we see the most common transformation of the lever, the action being continuous. While this may be rightly placed in the section devoted to pulleys, and will be treated more fully under such heading, a few illustrations will be given here so as to make clear to the student, the direct relation that the pulley or gear bears to the common lever. Below are shown several sketches of block and tackle, together with the skeleton lever upon which the pulley action is based.

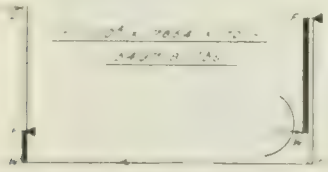


At A we see a single fixed block and pulley, over which the rope passes, the power, P, suspending the weight, W. It will immediately be seen that the force applied must equal the weight supported, as the lever arm in each case is exactly the same length, being the radius of the pulley. At B is shown another style of single block, but with a movable pulley; in this instance the power arm is equal to the diameter of the pulley, while the weight arm equals the radius, therefore, the weight lifted would be twice that of the power applied. A practical application of this particular style of block, however, is not often met with, and to make it more suitable for ordinary work, a modification like that shown at C is adopted, where a combination of a fixed and movable gives the result shown at B, but with the pull at F exerted in a downward direction. This, and the sketch at D, illustrates quite clearly the different factors of the compound lever. The mechanical advantage of the multiple block and tackle is exemplified in the skeleton sketch of the leverage at B. It will be noted that the only advantage derived by the fixed pulley is to

change the direction of the pull and facilitates the continuous movement of the cable in raising or lowering the weight. The skeleton sketch shows the fulcrum of the fixed pulley in the centre of the lever, while the fulcrum of the movable pulley is located at the extreme end, showing a combined application of the first and second class levers. It will be noted that the link connecting the second and third lever is suspended from the fulcrum F^2, but it must be understood that this fulcrum is on the movable pulley and, therefore, the upward movement represents the power at this point. The same condition applies at the fulcrum F_1. These examples have been given to show the relationship of the lever to the pulley. Practical problems will be given under the section devoted to wheels and pulleys.



In the above sketch of an airbrake mechanism, what pressure would be exerted at the brakeshoes B, if the air enters the cylinder A, at a pressure of 70 lbs. per sq. in.? To show more clearly the various factors entering into the solution the skeleton sketch below is given, the power arms represented by double lines, and the weight arms by heavy black lines.

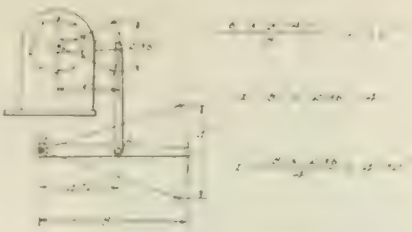


The pressure exerted against the upper end of the brake lever C, is equal to the area of the piston, in sq. in., times the initial air pressure, or:

It has been shown in a former lesson that the force applied multiplied by the force arms, will equal the weight multiplied by the weight arms. Therefore, the pressure exerted by the brakeshoe against the wheel will be:

In fitting a counter to a punch press, that has a stroke of 4 inches, it is found necessary to use an auxiliary lever to reduce the movement. This additional lever was 8 inches long, and it was desired to find the point of connection A, so as to give the proper travel to the lever on the counter.

With a 10-tooth ratchet on the counter it is necessary to have a movement



so that the pawl will just take one tooth at each stroke of the press. To provide a little over-travel and yet not enough to take two teeth, a movement of ⅛ of a revolution was deemed ample for the purpose. The travel of the outer end of the primary lever would then be approximately ⅛ of the circumference of a 6 inch circle, or 2.36 inches. The point A can then be found by proportion, and as shown above would be 4.72 inches from the fulcrum F, of the auxiliary lever.

AN ECONOMIC WAY TO HANDLE SHIPMENTS OF LONG IRON RODS

IN an installation of a Shaw Electric crane at the plant of Bayonne Bolt & Nut Co., of Bayonne, N.J., there is an important illustration of the manner in which one problem of handling material was solved by the application of a few small strands of wire.

This company receive quantities of bar stock-iron rods about twenty feet in length, and ranging in diameter from ¼ in. upward. This raw material comes in gondola cars on the company's private switches.

The unloading and stacking of the rods by hand was, however, a slow process. The rods had to be lifted, one at a time, from the cars and carried to various parts of the yard. From the flexible and yielding nature of the material the placing of a shipment was necessarily slow, and of course, expensive.

In seeking a better way to do the work an electric crane and magnet naturally suggested themselves, but the nature of the material to be handled again interposed an obstacle. With the rods lying loosely in the bottom of the car a hoisting magnet could not pick up a clean load. Some rods would hang and swing. To obviate this, the expedient of having the consigners wire the rods together in bundles of approximately a dozen, the size varying with the diameter, was adopted. With the rods in bundles the profitable use of an electric crane and a magnet became feasible and the apparatus was installed by the Shaw Electric Crane Company of New York.

With the bar stock in bundles the magnet makes a clean lift, not merely of one bundle, but of bundles up to its lifting capacity.

They are raised out of the car and piled practically at one operation. With the crane and magnet the company can now accomplish in a few minutes, work which under the old method took a gang of freight handlers hours to do. There is, besides the saving in labor, a gain in the speed of handling raw material.

Furthermore, the use of the crane permits the piling of rods to a greater height than would have been economically possible by hand work.

HOPE TO "WEIGH LIGHT"

Prof. W. W. Campbell of the Lick Observatory explains the problem of "weighing light" in his "Solar Eclipse Notes" in the Publications of the Astronomical Society of the Pacific, issued at San Francisco. Two British expeditions and at least one American expedition that went out to observe the total eclipse of the sun on May 29, expected to make their main business that of getting data to help solve the problem of weighing light. Prof. Campbell says:

"According to certain hypotheses, light radiations possess mass and are subject to gravitational disturbance. If the hypotheses in one form or another represent the truth, then rays of light proceeding from stars which are seen very nearly in the direction of the sun should be deflected from their straight-line courses, as these rays pass close to the sun and through the sun's gravitational field.

"If a ray of light coming from a star to the eclipse observer just grazes the edge of the sun but without touching the sun, it should be bent from its course in amount 0".87, according to one hypothesis, in twice this amount on another hypothesis, or not at all on a still different hypothesis. The eclipse of May 29 found the sun very favorably situated for the solution of this problem in the northern part of the Hyades cluster. A good number of stars in the photographic field, with the eclipsed sun in the centre, may be rectified with an exposure of ten seconds or less. Many eclipses will come and go before another will be so favorable in this regard."

At this writing we have no news from either the American or the British expeditions. Much other interesting scientific data may be expected when results of the eclipse observations are made known.

Government Labor Statistics.—The Alberta coal mines are calling for about 1,100 men. Returned soldiers are being asked for, and as there are many of these now in the West, incidental to the harvest, it is hoped that they will be available after the harvest for the mines. During August the Saskatchewan Labor Bureau placed 8,536 men out of 8,761 applying for work. There were out of this number, 1,264 Saskatchewan farmers who have suffered crop failure, the balance being mostly harvesters from Eastern Canada.

Harvesters for Railway Building.—The extensive railway construction going on in the Fort William district calls for a large number of men, and these are being procured from the ranks of the returning harvesters. It is estimated that at least 500 men will be drawn from this source and the railways are extending their cheap transportation for this purpose.

Transferring Your Product Efficiently

The Illustrations and Text Matter Describe How Users of Jeffery Equipment Overcame Their Haulage Problems. Perhaps You Can to Advantage Utilize Similar Methods in Your Plant

By J. H. MOORE, Associate Editor Canadian Machinery

THE problem of hauling your product from department to department is one well worthy of consideration, and the field that the electric storage battery locomotive occupies in this regard is already too well known to need comment.

Where the plant is of any real proportions an electric locomotive becomes almost a necessity if one wishes economical handling, and the purpose of this article is to present more in illustrated form than anything the advantages of such a system.

Before going on to describe these various photographs, let us first consider how one plant saved $60.00 daily by using locomotives.

The Park Falls Lumber Co. save 16 men and 18 horses each day by the use of Jeffery locomotives. This, they figure, saves them at least $60.00 every day. In some cases the track is as long as 1 mile, and a total mileage of 4 miles stretches throughout their yards.

Numerous other examples of saving could be quoted, but the one example will do in this case.

As everyone will agree, labor is scarce, making it necessary to increase the output per man. There is no doubt but what one man and a locomotive will do the work of many men, quicker, cheaper, and with less trouble and supervision.



FIG. 1—5-TON STORAGE BATTERY WITH CANOPY.

Referring to Fig. 1 we see a 5-ton locomotive equipped with canopy. It is capable of hauling 240-ton miles on level tracks on a single charge. If the battery is boosted at double normal rate for one hour in the middle of the day, it will be able to do 300-ton miles. A locomotive of this weight and battery capacity is very serviceable in climates where severe snows, storms, and low



FIG. 4—CONTRAST THE SPACE BETWEEN LOCOMOTIVE AND WAGON AND TEAM.

temperature are encountered and where haulage conditions become severe.

Fig. 2 illustrates an installation of a 5-ton Jeffery storage battery locomotive, used by the Oil Well Supply Co. of Oil City, Pa., to transfer various classes of material about their plant.

One cannot help but save money and time with such a system. It might be well to mention that these locomotives work on a track gauge of 20 inches.

The Columbia Plate Glass Co. finds this system of locomotive haulage to work to advantage, and Fig. 3 shows one such installation.

The space occupied by the industrial locomotive is also a big feature, for looking at Fig. 4 we cannot help but see that the locomotive and its train of cars do not take up as much width as the wagon and team of horses. When looking at this photo it is well to remember that the locomotive and its cars are nearest the camera, which further emphasizes the point already spoken of.

Last, but not least, we will consider Fig. 5. Here we see a view of the Seaman Sleeth Co., Allegheny, Pa., who, as can be noticed, handle considerable large castings. A Jeffery storage battery provides the hauling in this plant and results in considerable saving.

In conclusion we might say that when looking over your hauling problem, remember that the field which the industrial locomotive covers is well worthy of consideration.



FIG. 2 A TYPICAL JEFFERY INSTALLATION.

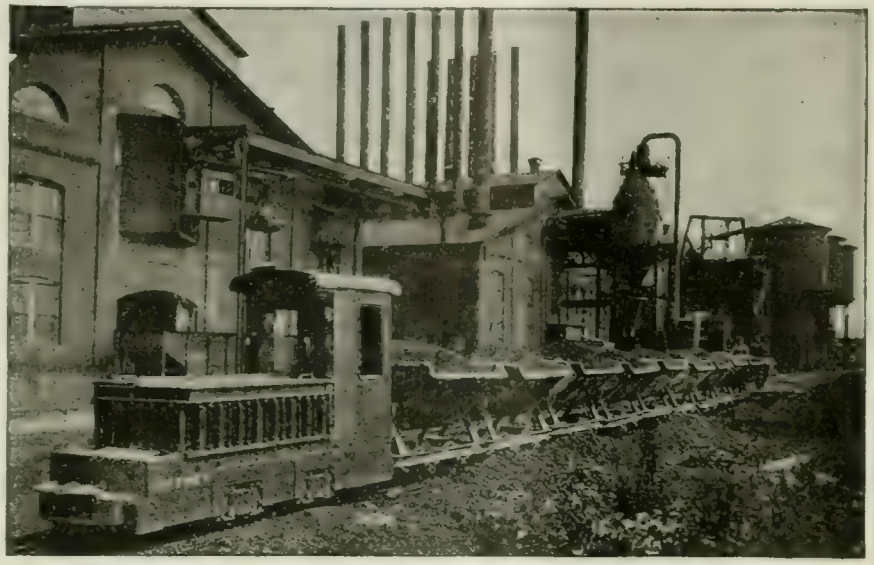


FIG. 3 AN INSTALLATION AT THE COLUMBIA PLATE GLASS CO.



[illegible] CO., ALLEGHENY, PA., [illegible] THEIR HEAVY CASTINGS.

DRAFTING COURSE RE-OPENS

CANADIAN MACHINERY Drafting Course reopens in the Sept. 18th issue. This will be welcome news to our many students who have been following up these studies, and now that the evenings are becoming much cooler, there is no reason why every reader interested cannot buckle down to work again, and send in his drawing plates.

When we commenced this course we hoped for considerable interest on the part of our readers, but the resulting interest shown has far exceeded our most sanguine expectations.

Students from one coast to the other are following up this course, and sending in their plates. We started to count our plates by tens, but soon hope to count them by the hundreds, as interest in these studies has grown by leaps and bounds.

You may perhaps have overlooked the possibilities of this course, and so far may not have started in to follow it up. Naturally you would not care to jump in at Part 8 without a knowledge of what came previous to this. But this fact need not deter you from entering, for we have prepared reprints of our former seven parts specially to help out such readers who did not grasp the former opportunity.

These reprints are absolutely free, and may be had for the asking.

We wish to impress readers of CANADIAN MACHINERY with the fact that our aim and object is service. This course is but **one form of our service, and originated by us.**

A course of such a nature as we are giving would cost you considerable money through any other channel, so why pay out big money for something you can secure for almost nothing?

If you are already a student make up your mind to plunge in afresh on the 18th, or if you belong to the class who have not yet started, write us for a set of reprints and get busy on this course right at the start.

We offer three prizes for the three best plates received on each part of the course, this being another feature which appeals to the reader.

We have yet to announce some prize winners on remaining plates. This will be done in our Sept 18th issue, so watch and see if your name is up in the honor roll.



WELDING AND CUTTING



The Judgment of the Oxy-Acetylene Process

The Views of the Technical Engineer on the Above Subject. Briefly, the Judgment Arrived at is That the Oxy-Acetylene Process is an Engineering Success, and a Fine Commercial Asset

By ALFRED S. KINSEY, Member A.S.M.E.

THE mechanical success of a mechanical process may depend on two factors, its utility as determined by the manufacturer, its efficiency as judged by the technical engineer. No one knows better than does the owner of the metal working plant or the superintendent of the repair shop how great the need has been for quicker and more horough methods of manufacture and ways of making repairs, and few have looked forward with greater interest than has the mechanical engineer to the coming of safer and more efficient mechanical devices and processes. One has been the stimulus of the inventor, the other the surety of the manufacturing world.

The technical engineer's position in this progressive age requires no evaluation, his critical scientific attitude no defense. His is the problem of casting beyond the superficiality to the durability of things, from the flimsy to the substantial. Unquestionably this has produced in the engineer a conservatism, a habit of close enquiry which make for safety and success. The manufacturing world, therefore, still seeks the judgment of such a mind, and the technical engineer's endorsement is often final. It may be of interest, therefore, to learn what he thinks of such a modern process as that of oxy-acetylene welding.

Up to the advent of autogeneous welding the engineer had only his experience with the forge weld upon which to base his calculations and judgment. In a way this proved somewhat unfortunate for the new method of welding, as the forge weld had nearly lost its value as a dependable means of joining materials. Imagine two pieces of steel being brought to a soft, plastic condition in a forge fire charged with sulphur from the fuel, an excess of oxygen from the indifferently operated bellows or fan blower, the cinders and refuse of the fuel and one can readily realize the cause of weak forge welds. Such welds never were reckoned to have a tensile efficiency of more than about 50 per cent., and many observations of welds which had failed showed crystallization and even entrapped cylinders. Navy yards and many other large shops had practically abandoned the forge weld, preferring the expensive substitute of machining a job out of the solid when it was possible to do so. Serious failures of forge welds were too common. The author recalls many of these, and particularly one regarding which he assisted in a suit for damages where a hoisting hook on a city pier had parted at the weld, causing the death of a father of a family of small children. There was a demand for a safer and more efficient way to weld steel and wrought iron.

Then, too, in those earlier days, the only metals which could be welded were wrought iron and steel. There was no way to weld cast iron and the non-ferrous metals like copper, brass and aluminum. The mechanical engineer, of all men, realized these limitations. He knew that the time was ripe for a new method of welding materials.

Then came autogeneous welding and cutting by the oxy-hydrogen process, soon to be superceded by oxy-acetylene, thanks to the electric furnace's efficient method of producing calcium carbide, and making acetylene a commercial possibility. From that time, practically only about fifteen years ago, metal workers, manufacturers, engineers, nearly the whole industrial world, have eagerly watched the progress of the oxy-acetylene process.

The mechanical engineer recognized at once that there were certain fundamental principles involved in oxy-acetylene welding which were new to shop practice such as:

First, that autogeneous welding was accomplished by fusion instead of plasticity. The old method required that the metal be heated merely to a soft, pasty condition and then hammered or pressed together, while the new way was to melt the metal and flow the two ends into one mass. By the former method there would not be a thorough mingling of the grains of the metal, because it was only plastic, and besides there was every opportunity for such a weld to receive gas and fuel impurities from the forge fire. By the new process there could be nearly perfect rearrangement of the grains due to the liquid condition of the metal. The mechanical engineer recognized at once, however, that while the fusion of castings for welding would be consistent with the method of their formation, that is, that both the original metal and the weld itself would be in the cast condition, this would not be true in the case of the welding of rolled or forged wrought iron or steel. There the two pieces of rolled or forged metal would be joined by a cast weld, the former being fine grained and strong, the latter of coarse grains and reduced tensile strength. This was not a new situation to the engineer. The benefits derived from hammer refining the grains of steel are well known. An ordinary machinist hammer, therefore, proved to be the cure of this trouble, and it may be of interest to relate that in some experiments performed during the past year by the author for the Air Reduction Co., of New York, at the shops of the Baltimore & Ohio Railroad, at Marinsburg, West Virginia, and at Brunswick, Md., some worn railroad frogs which were built up by the oxy-acetylene process, and allowed to cool directly from the liquid to the solid condition, lasted only a few weeks in service but when a progressive method of building up and hammering was resorted to some of the frogs lasted over nine months in continuous severe service.

Second, that as fusion was the chief requisite of a good weld, the new process might be used to join other metals than wrought iron and steel. This opened up wonderful possibilities, new indeed to welders, for cast iron and the non-ferrous metals had not yet been welded. Would it be possible for the new welders to learn the marked differences of characteristics of steel, cast iron, copper, brass, aluminum? We

*Professor of Shop Practice, Stevens Institute of Technology. Advisory Engineer Air Reduction Company, 120 Broadway, N.Y.

have but to call to mind the work being done in the welding of iron castings alone to get an answer and to form an idea of the possibilities and value of the oxy-acetylene process for the welding of cast iron. The author recently had to do with the oxy-acetylene welding of three broken cast iron cylinders of freight locomotives, which cost $515 to weld and put in good working order, but would have cost $3,600 to replace by new cylinders if oxy-acetylene welding had not been available, leaving out of consideration the long delay in getting the locomotives back in service by the old method of making repairs as compared with the few days' lay up for welding.

Third, that the gases used in an oxy-acetylene torch operated by inexperienced welders might easily be made to lower the value of the weld. Many of the first oxyacetylene welds were badly crystallized. The engineer knew this and waited for developments. The first designs of torches were much to blame for this condition, but the inexperience of the welder was more so. It is not unusual now to find oxy-acetylene welds so homogeneous as to make it practically impossible to see any difference between the original material and its weld.

Fourth, that unusual problems of expansion and contraction must be reckoned with in the job welded by oxy-acetylene. No one would attempt to dispute this. The cautiousness of the engineer in this regard may well be understood. It has required an experimental experience to master these difficulties, but they do not stand in our way now.

Fifth.—That the heating of the oxy-acetylene weld was accomplished by the powerful quick-acting flame instead of a slow forge fire. It was readily seen that a trained eye would be required to bring about good results from the working of the metal in the molten conditions. What would happen if the metal were overheated? What if the original metal were not thoroughly melted when the molten rod was dropped upon it? A man must know more than a blacksmith about hot metals to be an oxy-acetylene welder. Could such men be gotten and could their skill be relied upon? We know the encouraging answer to these questions now, but they recall to some at least the time of not so long ago when the mechanical engineer struggled with his welders to teach them the difference between molten metal and burnt metal. We venture to say that it will be much easier to make good oxy-acetylene welders from now on than it has been heretofore.

In this connection it may be of interest to describe the results of some work performed by the author, as an effort to help win the war. At that time, as you know, there was a great need of the use of the oxy-acetylene welding and cutting of metals. Trained welders were scarce and many men were being pressed in the work without proper knowledge of the way it should be performed. At the request of those in charge of these men it became our privilege to form a night school for oxy-acetylene welders at the Twenty-Third Street Y.M.C.A., New York. The course consisted of lectures on the metallurgy and general principles of the work, followed by the actual use of the welding and cutting torches on special jobs in the shop. We took in men who were working on war orders in the shipyard and other large shops, and also other men who would learn to be welders and take positions in the shops doing war work. Over 200 men were trained the first year, about 75 per cent. of whom proved to be successful welders so far as we have been able to follow them up. It was easy to see why these men were failing in their daily labors with the torch, and their rapid advancement after a few evenings of instruction clearly proved the importance of a special training in the subject. As a more marked illustration of the value of such a training, however, we may mention an experiment in this same evening school of a special class selected from the non-essential industries. The men had been earning a livelihood as furniture salesmen, laundrymen, hat dyers, printers, bookkeepers, waiters, plasterers, signalmen, art students, saloonkeepers, etc. Seventeen out of the twenty in the class became good welders, and went to work in shipyards and shop with a zeal that was surprisingly new to them.

To continue this subject a bit further it will be apropos to call attention to the attitude of the technical engineer toward the teaching of the oxy-acetylene processes in the engineering colleges. Some of these institutions were not slow to grasp the importance of the subject. The Stevens Institute of Technology was probably the first college to take up the work. The author has lectured for about ten years on the subject as head of the department of shop practice in that institution, and some time ago we added a course of jobs to be welded by the oxy-acetylene torch which every student at Stevens has been required to take. We have heard of other engineering colleges who have introduced such a course, and we understand that Harvard's new engineering school is about to include oxy-acetylene welding in the instruction of its shop department.

In college and abroad in the world of engineering construction and repairs the technical engineer has been giving careful thought to the possibilities and advantages of oxy-acetylene welding. He has encouraged its trial in shop, foundry, and manufacturing plant. He has studied its evolution from the rough joint of doubtful value to the homogeneous weld of nearly 100 per cent. efficiency. If he has been conservative in his judgment it was because he knew better than others of the undeveloped parts of the new field being entered by the welder; if he has appeared to be slow to accept the process for the most important high-pressure and high-tension work it is because he has waited to prove that the new welder could measure up to his increased responsibility. One thing he will not do, he will not forget the inherent crudeness of the work, nor the varying personal errors of the best workmen and expect impractical refinements. A small fraction of sulphuretted hydrogen and phosphoretted hydrogen in the acetylene or a little difference in the purity of oxygen will not disturb his acquired confidence in the possibilities of a good weld by the new process. He has learned to appreciate the difference between a 50 per cent. plastic weld and a 90 per cent. fusion weld.

The author has discussed oxy-acetylene welding with many of the leading technical engineers of the country, men who are in responsible charge of immense engineering plants. Five years ago almost all of these men would have advised a delayed acceptance and further study of the advantages of the process. To-day they do not hesitate. Their minds are made up. From study and experience they speak, and because of the nature of the heat supply, which can easily be made a non-oxidizing reducing flame, because of the effect of the process on the physical efficiency of the actual weld, because of the portability of the welding apparatus, and because of the economy of the process their judgment is that the oxy-acetylene process of welding metals is an engineering success and a fine commercial asset.

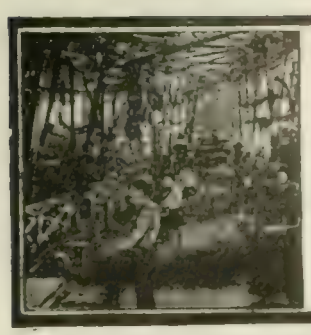
AIRPLANE DEVELOPMENTS

The following statement of the National Advisory Committee for Aeronautics shows the development in airplanes which has been made since 1903. The first man-carrying airplane flights were made in December, 1903, with the Wright Bros. engine, developing 12 h.p. and weighing 152 lb., or 12.7 lb. per h.p. In 1910, the average horsepower for aeronautic engines had increased to 54, and the weight had decreased to 5.7 lb. per h.p. After another 7 years, in 1917, the average power output had advanced to 243 h.p., and the weight had decreased to 2.8 lb. per h.p.

In March, 1918, the Liberty motor developed 432 h.p. for a weight of 808 lb., or 1.86 lb., per h.p. At present, the Liberty motor is developing a maximum of 450 h.p. for a weight of 825 lb., or 1.83 lb. per h.p.

The average consumption of fuel decreased from about 0.8 lb. per h.p. in 1903 to 0.55 lb. in 1918, and for the Liberty engine to 0.50 lb. The present consumption is about 0.46 lb. per hr.

For one horsepower of energy expended $500 worth of textiles is produced, $300 worth of iron or steel, $1700 worth of printing. In the textile industries, where the cost is not exceptional, the cost per horsepower is calculated to $20 or $30, indicating a power cost of 5 per cent. of the total cost of production. Development of a river of electrical energy is suggested stretching from New England to the Southern States, and the transformation of coal to power in the mining fields, instead of transporting it over the railroads to factories far and near.



DEVELOPMENTS IN SHOP EQUIPMENT



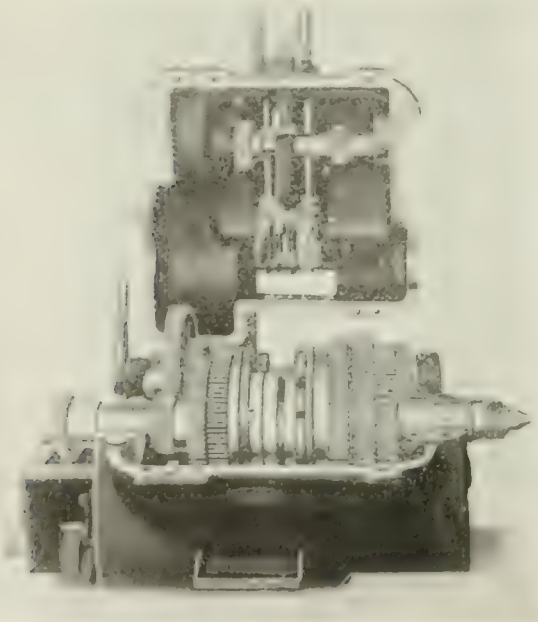
GEARED HEAD LATHES

Lathes with geared heads for either belt or motor drive are announced by the Cisco Machine Tool Co., Cincinnati. The geared head on the belt-driven machine has a double friction countershaft, one friction running 300 r.p.m. and the other 130 r.p.m. The 300 r.p.m. friction has control of 10 spindle speeds, 300 and 200 with back gears out, 214, 146, 116, 78, 54, 36, 29, and 19 with back gears in.

The 130 r.p.m. friction has control of 10 spindle speeds, 130, and 88 with back gears out and 93, 63, 50, 34, 23, 15, 12, and 8.5 with back gears in. There are four levers, including the back gear lever, required for these changes. One handle controls the friction on the spindle and two handles control the shifting of four back gears on the eccentric shaft. A pull pin in the face gear is used to run straight from the spindle when the back gears are out. The eccentric shaft lever or back gear lever meshes back gears with spindle gears. On the spindle are a friction and six gears, on the back shaft four gears, on the drive shaft two gears, all gears and spindles being of 0.40 to 0.45 carbon steel. Except the drive shaft gears, which are rawhide, all geared heads have ball bearings.

In applying the motor to the geared head a plate is placed on the top of the regular geared head with a bracket on the plate for an intermediate stud. On the intermediate stud is a rawhide intermediate gear. A pinion is placed on the motor and a gear on the drive shaft, both pinion and gear being made of steel. The gears are covered and the spindle speeds are 220 and 150 r.p.m. with back gears out and 158, 107, 86, 58, 40, 27, 21 and 14 with back gears in.

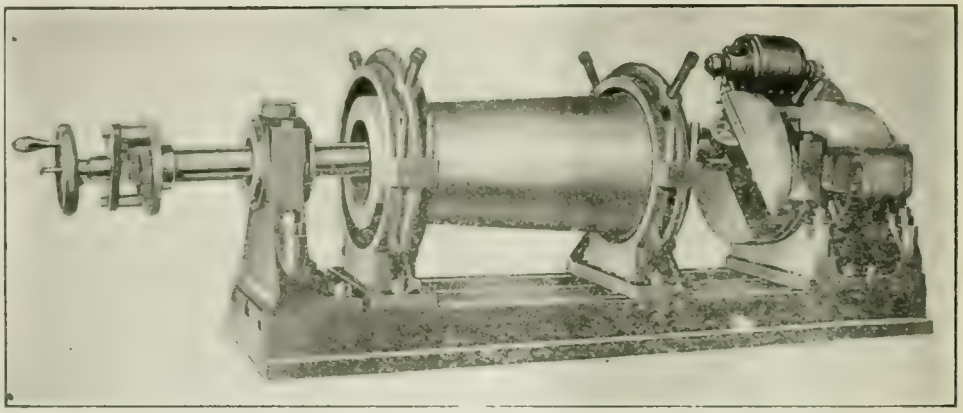
The lathes are made in four sizes, 14, 16, 18 and 24 in. For motor drive, these lathes require a 2½, 3, 5 and 7½-h.p. motor respectively. The manufacturer specifies a General Electric motor at 1,700 r.p.m. for direct current or a Westinghouse motor at 1,200 r.p.m.



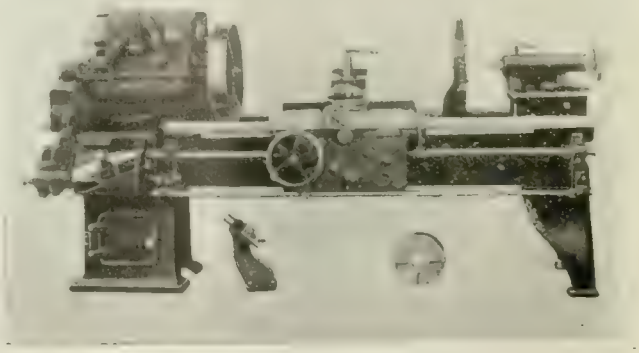
INSIDE VIEW OF GEARED HEAD.

PEDRICK TAPER BORING MACHINE

A horizontal taper hole boring machine, which is suitable for boring any taper that is ordinarily used in machine work, has been designed and built by the Pedrick Tool & Machine Co., 3639 N. Lawrence St., Philadelphia, Pa., and is here illustrated and described. The machine is simply and rigidly constructed. The boring-bar and driving mechanism are supported by three pedestals which are mounted on a bed-plate. The boring-bar is connected to a sliding block on the faceplate by means of a strongly constructed hinge joint. The degree of taper to which the work is to be bored is determined by the distance that this sliding block is moved away from the centre of the faceplate; thus it is obvious that when the sliding block is located in the centre of the faceplate, the machine is adapted for straight boring operations. The boring-bar is supported



GENERAL VIEW OF THE BORING MACHINE.

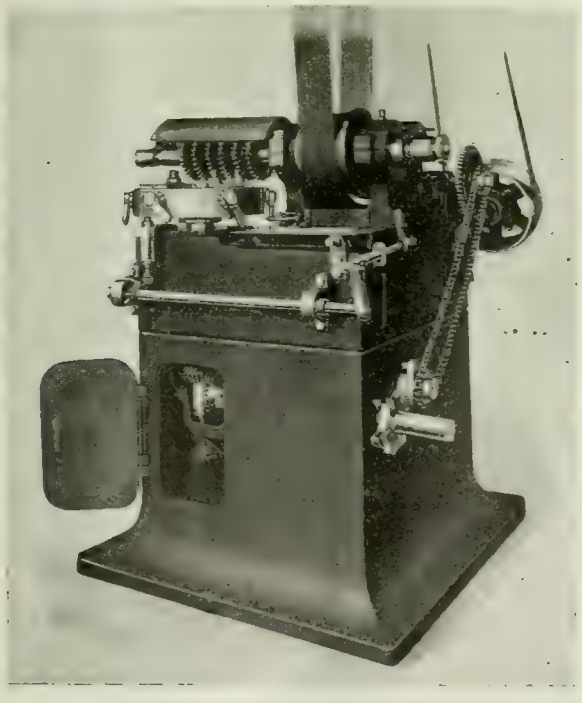


GENERAL VIEW OF THE LATHE.

in a pedestal at the rear end of the bed by a bearing which has been designed to permit the necessary oscillation or orbital movement of the boring-bar. The feed-screw which traverses the cutter-head along the boring-bar is imbedded in a grove in the boring-bar. The feeding mechanism located at the rear end of the boring-bar controls this feed-screw by means of a constant automatic movement which is changeable to permit the taking of roughing and finishing cuts. The work is supported on two steadyrests which are also mounted on the bedplate. The bedplate is 28 inches wide by 96 inches long; and the boring-bar is 3 inches in diameter. The cylinder, which is shown on the mounted machine, was bored a distance of 30 inches, the bore being 12 inches in diameter at one end and 9 inches in diameter at the other end. The machine may be equipped for either belt or motor drive.

SEMI-AUTOMATIC MILLER

The F. C. Sanford Manufacturing Co., 2060 Fairfield Ave., Bridgeport, Conn., has developed a semi-automatic milling machine for the milling of valve heads, lock nuts, or work of a like nature. This machine has a sliding head which carries the arbor, which in turn carries a gang of six side-cutting mills. The table consists of a chuck having six sets of jaws. To operate the machine the operator places the work in the first set of jaws.



GENERAL VIEW OF THE MACHINE

At the end of the reverse stroke, the chuck or table turns one-sixth of a circle and automatically locks. The head advances and No. 1 hub is faced on two sides by cutters No. 1 and No. 2. On the second stroke the table has made another one-sixth of a full turn and the second two sides of No. 1 hub are milled by cutters No. 3 and No. 4, as well as the first two sides of hub No. 2. With the third stroke, the table has made its full half turn and the last two sides of hub No. 1 are completed, the second two sides of hub No. 2 and the first two sides of hub No. 3.

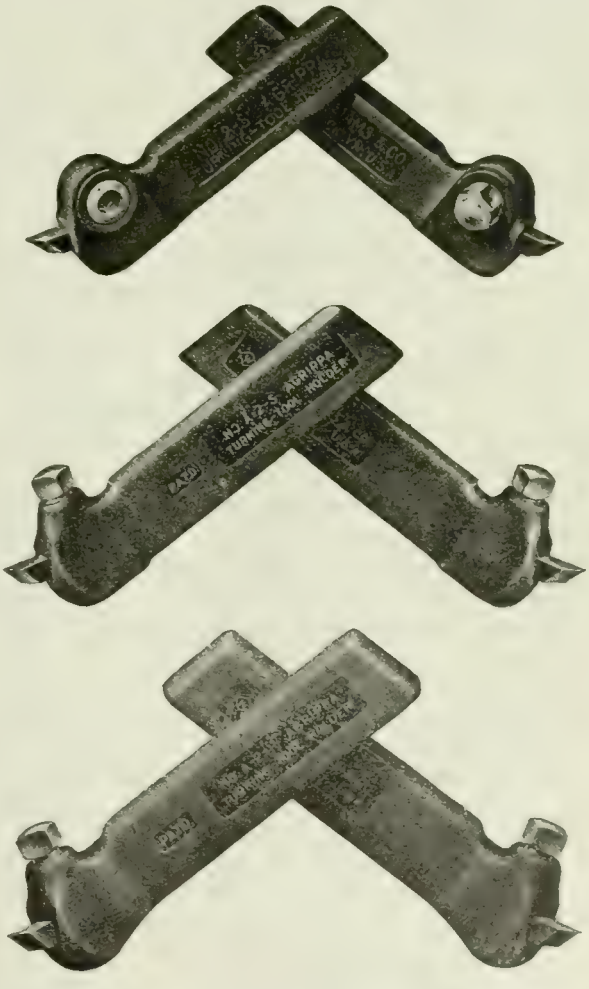
"AGRIPPA" TURNING TOOLS

J. H. WILLIAMS Co., manufacturers of dropforgings and drop-forged tools with plants at Brooklyn and Buffalo, N. Y., have added a line of Set Screw Pattern Turning-Tools with right and left-hand offset and straight shanks, to their present well-known "Agrippa" Tool Holders. These latter already include a full line in a wide range of sizes for all regular machining operations: Turning, boring, planing, threading, knurling, cutting-off and side work. Several of these styles, among them turning-tools, are fitted with a cutter-fastening device in the shape of a cam (see cut) instead of the conventional set screw. The plans are furnished either of the hex head or headless type.

The nose of the holders, or shanks of both cam and set screw turning tools is broached to accurate size in special machines and provides an absolutely rigid seat for the cutter, a fundamental requirement in tool-holder efficiency.

For those who purchase cutters made of a steel rolled to the variation in size common to usual mill practice, the makers recommend turning tools of the cam-fastening pattern as giving the greatest economy, strength and economy. It is rapid and positive—the greater the pressure the tighter the lock. But the gradual rise of the cam, while providing great power, obviously limits its range of contact; consequently, where the size of steel used in cutters which are not ground to bearing size, as in turning-tools, varies beyond established limits, the markets offer this new line of Set Screw Pattern Turning Tools at the same price as for corresponding sizes of the Cam Pattern Holder.

The screws, made of a fine grade of alloy steel, are accurately machined and carefully heat-treated and hardened. They are unusually tough and strong and



beveled to permit their convenient use in close quarters. The tools are all drop-forged from a strong, tough grade of carefully selected steel and are submitted after forging, to a special heat-treatment or refining process which develops not only resistance to all wears but also the great strength necessary to overcome the pushing thrust imposed upon the cutters. The cutter-holding channel is carefully broached to accurate size in special machines and provides an absolutely rigid seat for the cutter, a fundamental requirement in tool-holder efficiency.

"Agrippa" Cutters, made from high speed bar steel are cut to the "diamond point" form or bevel. They thus provide for the most common requirements with a minimum of grinding for either right or left-hand usage; also the full extent of economical service that distinguishes this superior line of tool holders.

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Making War on Accidents

THE farms of Ontario have more accidents than its factories.

The accidents in United States are more serious and numerous than its casualty list in the war.

That latter statement can easily be substantiated by figures taken from the nineteen months during which United States was a participant in the war.

In that period 50,150 Americans died in battle, or as a result of wounds received in action. During that same period in America, approximately 126,000 men, women and children lost their lives in accidents. Of this number two-thirds were killed in accidents outside of industrial plants.

The Census Bureau of the United States Department of Commerce keeps a close record of accidents, and it is worth while knowing just how people do get mangled and killed. Taking as a basis a group of 100,000 people, here are some of the things that have a fairly high average:—

Falls: 14.8 per 100,000, or a total in the last year for which figures are available, of 11,114.

Railroad accidents: 11.5, or 8,649 in the year under review.

Others follow in this order:—

Burns: 9.1, or in a year, 6,830.

Auto accidents: 8.9, or 6,724.

Drownings: 7.4, or in all, 5,550.

Machinery accidents caused 2,112 deaths, or 2.8 per 100,000, and this rate compared with other years, is considered high.

It is gratifying to know that real progress is being made by some firms in cutting down the number of accidents in their shops. For instance, R. G. Adair, safety engineer of the American Rolling Mill Company, at Middleton, Ohio, has been able to make a worth-while report for the first five months of the present year.

This report shows a reduction of 91.9 per cent. in the total compensation paid by the company during the period mentioned, a reduction of 46 per cent. in the total number of lost time accidents and a reduction of 51 per cent. in the total days lost as the result of accidents.

Perhaps the most striking item in the tabulation is that showing a total outlay for compensation of accidents amounting to $1.71 for the month of May, 1919, in a plant employing 3,500 men. The decrease in accidents shown in Mr. Adair's report is all the more significant in view of the fact that the 1918 figures, which are used as a basis of comparison, show a relatively low accident experience.

In the five months of 1918, compensation amounted to $20,638.22, against $1,340.26 this year, making a reduction of 91.9 per cent.

Total lost time, accidents in 1918 (5 months) 210, against 83 this year.

Total days lost in 1918, 2,523, against 868 this year.

The business of making the shop a safer place to work has made big strides in Canada. The Western mining field was for some years a leader in the business of killing men. There are rows of little black crosses dotting the foothills of the Rockies that tell their own story all too well.

But we are passing the stage where the big chance or the little chance is left open. Of course there is always the fool-killer around the premises. It seems well-nigh impossible to weed him out. A fresh batch is always on the incoming freight.

It's a great work, though, making conditions such that a man is less likely to lose a limb or his life while out making a living.

The Trade and Technical Papers

THE position and business of the trade paper is coming to be more and more recognized by those who have occasion to dig beneath the surface in any particular line, and get down to real facts.

The trade press does not appeal to the mob. It is not a political organ, nor is its purpose merely to entertain. Its mission is to present information along specific lines, to publish the views of men who have succeeded, to give methods and schemes for doing mechanical things the best and most efficient way, to make a mechanic a better mechanic or a salesman a better salesman. In reality the trade paper is the medium through which the man who wants help can get it.

In the Ohio State University Department of Electrical Engineering there is a course in industrial lighting. The literature sent out by the University has the following in regard to the assistance the University authorities are getting from the trade press. Referring to the rapidity with which accepted theories and practices are being scrapped to make room for new ideas, the University letter says:

"One result of this rapid development is that the best available textbooks are to a large extent out-of-date before they are off the press. We are, therefore, confining the work of the course mostly to these letters and to that most up-to-date form of technical literature, the trade publications. We are fortunate in the large amount of good material that is available in the lighting field."

In other words, the trade press is regarded by the Ohio State University as being of more importance than all the textbooks that are coming off the press, because it can keep up to the minute, while a textbook has to stand for certain stated beliefs, even while the procession passes along and leaves those beliefs old and without a following. Again, the University authorities can have

no ulterior motive in stating their views on the matter. They are out to secure all the information they can along certain modern problems. They want to bring to bear on their problems every bit of worth-while knowledge they can secure, and their tried experience has been that they find this material in the trade press.

That is exactly the work CANADIAN MACHINERY is trying to do. If there are new ideas being brought out, new machinery, new devices, it is our business to get them for our readers. If our readers know of new things or better things or more efficient methods than are now practised, we want to hear of them.

The trade and technical paper is the friend of the man who wants to go farther up, and the men who have succeeded in going farther up are the best friends and most constant readers of the trade and technical papers.

Ingenuity Displayed By Native Races

THE possession of a wonderful mechanical sense by more or less primitive races is referred to in an interesting manner by an editorial writer in *The Practical Engineer*, a British publication. Where native labor is employed on engineering works, cases arise where it is wise on the part of the supervising engineer to leave the overcoming of certain difficulties to the solution arrived at by the native mind. Interesting instances of the successful application of this policy are mentioned. There is the case of a dam in Egypt, which was giving trouble through leakage, though the exact spot where the weakness existed was not apparent. A native Egyptian employed on the job conceived the idea of coloring the water on the high side of the dam in order to detect the spot where the leakage appeared on the low side.

The engineering feat we hear of so frequently now of placing the centre span of a bridge by floating it on lighters to its place, and then raising it, was not unknown to the Chinese. In fact it is claimed that it was a Chinese who first utilized the buoyancy of lighters and the help of a tidal stream to place girders in this fashion.

Transporting a Lancashire boiler where there were no roads was encompassed by slinging it bodily on bamboo poles, and manning the poles with enough coolies to carry the weight. Naturally labor was cheap where this method was employed.

Transporting a vertical boiler up a hillside was done by the Chinese headman by means of what we would call parbuckling. The boiler was laid on its side and ropes were passed around it, one end of the rope being made fast to convenient trees, the other end being taken round the barrel of a winch. The winch being started winding in the rope, the boiler naturally rolled up.

This does not seem to us to be nearly so good an instance as the next one, which showed really excellent mechanical thought. This case was of a nine-ton flywheel, which had to be taken to the summit of a hill. Obviously such a wheel was too heavy to take any chances of rolling it up, as one slip would have meant disaster. The Chinese headman was told to get it up, and then left to his own devices. He immediately proceeded to drive strong stakes into the hillside at long intervals, leaving them about three feet above the surface. He then secured some screwed pipe, and screwed a flange on each end of a piece just long enough to fit over the stake. To the top flange he fitted long bars to act as capstan bars. The wheel was then raised by levers, and rollers fitted under it as it lay on its flat. The rope was attached, and the loose end passed around the improvised winch on the stake. Enough men were then placed on the capstan bars, and the order given to heave away. The men walked round and the flywheel came up the hill. When it had reached the stake it was chocked up, the rope let go, and the winch was taken bodily to the next stake. The distance apart of the stakes was limited by the length of the rope available. This was about as safe and quick a way as could have been devised by any one under the conditions prevailing, and was thought out and adopted by a man who had never heard of the principles of mechanics.

On Regulatin' Prices

IT is a joyful thing, for sure, to read in these here times of how they're treatin' profiteers to jail terms and to fines, and makin' them loose up a spell and drop their ponderous wad, and get right out to earn their bread by gougin' up the sod.

With pure delight I scan them things, I read 'em line on line, while chills of pleasure and of joy they camp upon my spine.

Ah, well, it's time some move was made to shove us folks ahead, and push away the clouds that hang and bump upon our head; it's time they made our dollar sprout like some sweet-smelling vine, for it has shrunk to most like two nickels and a dime.

I wish them men would give to me a seat upon the board that's goin' to boot the prices down and scatter out the horde. I'd like to hear 'em call me out: "Old top, come have a seat, and use your brain to regulate the price of hay and meat."

I'd wiggle my big ears, I would, and hear the widder's cry about the price of liver a-campin' far too high, and then I'd set at once to work upon my new board seat to see that folks like me and you could get enough to eat.

I'd say to them what carve the cows, the rooster and the swine, that pounds of pork chops hence shall sell for just one single dime. A luscious T-bone steak I'd mark with paint and letters bold, and tell 'em that for fifteen cents that there thing should be sold.

I'd go unto the grocery store and say: "You grocery man, just yank the prices you've struck upon each prune and fig and can, and take 'em quick from out of here; forget your glorious days, and I shall teach you, yes, by gum, to walk in humble ways."

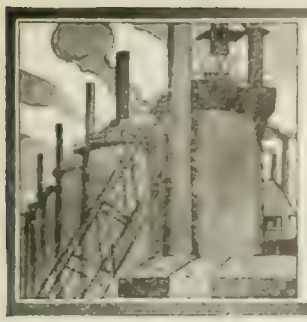
I'd take the hands of time quite rough and wind 'em back a spell before I'd give them grocery men the high sign for to sell. The good old days, the grand old days I'd bring back with a bound, when butter dished up in a boat at 20 cents a pound.

I'd travel up and down the street, I'd visit every place, and buyers would be cheerin' me, a smile hung on their face.

And for my friends what like to smoke I'd surely do a turn, rememberin' cabbage leaves and truck and all things that would burn. The cheers would rise up like a cloud, they'd come from near and far, as I led back to life once more a good five-cent cigar.—ARK.

THIS country's big chance now is to get down to the business of production. Labor trouble is righting itself, and Canada should be in a position to go in and supply the demands of nations that must purchase immediately.

It is difficult to harden a long, thin piece of steel without considerable warping. This is due to the cooling of different parts at different times, producing internal strains. If the red-hot piece is allowed to slide into the liquid on a chute held at an angle of about 45°, it will strike the water, end foremost, and cut into it at once. This gives better results than dropping it directly from the tongs, as the latter allow it to tilt, which will keep it from cutting in sharply and delay the contact of the liquid with some parts of the surface, thus causing warping. The chute may be a piece of scrap iron or tin, about 2 ft. long, bent up on two sides as shown.



MARKET DEVELOPMENTS



Machine Tools May Go To Higher Mark

Makers Expected Reductions in Labor and Material Following the War, But They Did Not Come—Preference For British Goods in Many Places, But There is Difficulty in Getting Deliveries

THERE is business in this country for British firms, providing they can supply the material, and meet any reasonable demand for delivery. In many cases it is a fact that the price is not the determining factor. One dealer this week stated that his house was constantly coming in contact with firms that expressed a preference for British-made goods. He instanced a case where equipment is required for a ship. Here a wait of as long as six months would not be objected to provided delivery could be definitely promised. Dealers who have been handling British lines, however, report very little improvement in the matter of securing the material they want. Any improvement that can be made on the part of the British firms, it is safe to say, will meet with a quick response in this country.

The future of machine tools is just a little uncertain regarding the important matter of prices. Following the war many makers, anticipating a drop in wages and the price of raw material, made a reduction of their prices. The reduction did not come in wages and material, and the makers are growing weary waiting for signs of this taking place, although they do not wish to put prices up. New York advices state that there will be increases in many lines of machine tools that will bring them back to where they were in war days.

Canadian bar mills are well booked with business just now, in fact it is likely that when they go out after business again it will be at an increased rate.

The scrap metal market is doing a fair amount of business, and that is about all that can be said for it. Shipping that is being done by the larger dealers to points outside Canada is on contract only, and new business is not being taken on. Prices show no change, and there is some dullness hanging over the whole market.

MORE STABILITY NEEDED TO BRING MONTREAL MARKET BACK TO NORMAL

Special to CANADIAN MACHINERY.

MONTREAL, Que., September 11.—Trade conditions are still influenced by many factors that tend to extend the period of uncertainty through which we have been passing during the past season. Local labor disturbances are not of a character to seriously affect conditions, but the activity in the district reflects the unsettlement that prevails in other places. Strikes and unrest in the States have been indirectly responsible for the dullness that has prevailed in many Canadian centres, and while this is not pronounced there is every reason to believe that industrial activity would be on a larger scale if normal conditions were more uniform. Transatlantic freight traffic has been seriously handicapped through continued strikes in many of the British dockyards, resulting in delays that have been reflected on this side. Passenger sailings have been interfered with, and in consequence mail has frequently been carried by cargo steamers. The situation is improving, however, and shipping companies are generally in a position to accept all freight offered for European ports. Plenty of space is available to South American ports. Business activity is of a normal character at present but trading is invariably based on present requirements, as conditions are not conducive to the covering of future needs. Steel business is steady but sales do not indicate any large development of a specific character. The non-ferrous metal situation is quiet with normal demand. Machine tool requirement is largely for single tools, but distribution is quite extensive. Second-hand demand has shown a falling off. Scrap continues listless with the market firm.

Activity on a Pre-War Basis

"While there has been no outstanding development in the steel situation as affecting local conditions, the volume of trade is of a normal character, and compares favorably with pre-war movement," remarked a dealer to CANADIAN MACHINERY. "The present requirements of the trade would signify that the greater percentage of material demand is of a general nature and more in the way of general maintenance than the development of new activities." The feeling that industrial unrest is still a factor in the iron and steel market is still prevalent, and dealers are inclined to suppose that this will continue to be an influence in fall trading. The present movement for conciliation between capital and labor in the States is looked forward to with interest as early future conditions hinge on a satisfactory settlement of this momentous problem. However, it may be said with some assurance, that the possibility of actual strife in the steel industry is less likely now that the President has taken a hand in the matter, but time alone can show what the outcome will be. The local movement of iron and steel commodities is principally in small lots, and no particular class predominates. No price changes are reported but those prevailing are firm in character.

Metals Steady and Firm

Normal business marks the trading in metals and in face of the quiet activity of the past week the market has been devoid of feature. The requirement of the consumer is light and only immediate or near future needs are considered. Quotations in most cases are firm, with the exception of aluminum, which shows a stronger tone, but the price is still unchanged. Antimony is going better, and prices have been marked up to 10

cents per pound. This is an advance of ¼ cent over last week.

Machinery Movement Steady

Dealers continue to report a fair volume of business in light orders, this demand emphasizing the wider distribution of general trade requirements, this being a very encouraging factor in the transition period of readjustment. It is interesting to note that the balance of trade is gradually swinging around in favor of new tools, the inquiry for used equipment being less pronounced. The movement of second-hand machinery, however, is still a profitable factor of current business. Whether the difficulties associated with labor or the general changed conditions is the influencing factor, there is evidence that recent inquiry would indicate that the demand for labor-saving machines is steadily increasing. Where manufacturing is carried on on a large scale this feature is becoming emphasized. Supply demand is keeping up and prices on the average are well maintained.

Strength in Cast Scrap

The old material situation differs very little from that which has prevailed for the past several weeks. Trading is comparatively quiet and no pronounced activity is reported in any particular line. While business is not moving in any large volume the interest is sufficient to sustain the firmness in the market. There is still an uncertain atmosphere surrounding conditions in the States and this is reflected in local scrap circles. Cast iron scrap is most active and the demand is for considerable volume but well distributed. Small iron foundries are quite busy and their requirements are of a steady character. Machine cast iron has advanced $3 during the past week and local dealers are quoting $23 per ton. Stove plate shows a similar advance, the price quoted being $17 per ton. Strength has developed in wrought iron pipe, the quotation of $10 being an advance of $2 per ton. Old metal prices are holding firm on a steady but light demand. Aluminum is quoted up 3 cents, the price being 21 cents per pound.

POINTS IN WEEK'S MARKETING NOTES

New York reports that machine tool makers may announce an increase that will bring them back to war prices. After the war prices went down, anticipating a drop in wages and labor. These did not come, and makers are going to revert to war values.

Sale of small tools is rather dull this week.

Dealers report a strong preference for British-made goods, a willingness being expressed in some instances to wait for long deliveries.

Pittsburgh says that the chances of a strike in the steel business are becoming more remote for the present at least.

An advance has been made in bars by some of the makers amounting to about $2 per ton.

Scrap metal market is unchanged in price, and dealers are shipping only on contract.

For the first time in some months one Toronto warehouse has received a specification calling for acid plate.

FEELING FAVORABLE TO BRITISH TRADE

But Trouble is in Getting the Supplies Through at Present Time

TORONTO.—Weeks have been much the same lately, nothing has happened during the past few days to break the sameness. There is still a fairly good volume of business moving, and some very large contracts are being worked on just now. Warehouses have, in several cases, been asked to get ready to take care of fairly heavy specifications. If they materialize it is certain that the shops taking the work on will be well employed for the remainder of the season.

Machine Tool Prices

Although no general announcement has been made of an increase, there is a feeling in machine tool circles that a rise is likely to come in the very near future. Deliveries are not as good as they were some time ago, in fact it is a notable thing that each successive month makes delivery dates a little less satisfactory on several lines.

Again, it is pointed out that the prices of some of the machines were put down after the war by the makers, on the assumption that the prices of labor and material would soon drop. These latter things have not taken place, with the result that prices of many lines of machine tools are likely to be placed back almost at the point where they were during the period of the war, when a person had almost to have a Government order and a Government shot-gun in order to secure any of the much-wanted machine tools. It must be said that there is a tendency in many circles to keep the prices down, it being felt that further increases now will not help matters. There are times when intimation of a price increase will help to close up a lot of business that has been lying around. There is a case in point right now, where notice was given that a machine used largely in the publishing business was going to be increased in price. The selling price as a general thing has been around $2,700, and the proposed increase was going to be around the ten per cent. mark. The result seems to have been that every prospect in sight was closed with, and the firm is now swamped with the business that resulted. That is generally the way of the market, but in the machine tool field just now, salesmen find it harder to get any more for machine tools than the present lists call for.

Want Old Country Material

One large warehouse reports that it finds a strong desire to secure Old Country material in many cases.

This house reported that it ought to be easy for a British house to come in here and do business, as there are many cases where specifications ask for these lines. Dealers who have been handling British lines, in some cases exclusively, report that it is a serious matter for them to get shipments through, regardless of whether the price is too high or not. There are certain lines of steel, cutlery, etc., on which it is impossible to secure deliveries. From reports that these agencies have in this country improvement is slow in Britain, and they can see no reason for expecting anything like a real improvement in the near future.

Asking For Tenders

Some boiler work may be placed in Canada for shipment to Egypt. The specifications for this call for acid plate. This is about the first time in months that the firms asked for figures on the business have been asked to supply this particular kind of plate, as practically all the plate business is straight basic. There are not many mills where the acid process plate is turned out, and the price charged for it will be about $1.50 per hundred above the basic.

Reference was made in the markets of last week in regard to business for steel for a bridge in an Ontario city, and as far as can be learned that business has not been placed. One dealer took it at 3.10 laid down in Peterborough, and apparently depended on being able to place the business at one of the Ontario mills at a price that would allow him a profit at the 3.10. One mill replied with a 3.23 price in Peterborough, while the nearest another of those able to handle the business would come was 3.13. Just what the holder of the contract is going to do with the business remains to be seen.

There is a feeling of more confidence in the steel market, as there seems to be no likelihood of a strike at the mills for the present at least. A week or so ago the Canadian selling agents of some of the U.S. mills seemed to be certain that there would be trouble. Some of the warehouses here were none too well fixed for material, and prospects of a strike, or of a holdup of material were not pleasing. Warehouses in several cases are buying heavily at present, preferring to get their stock in good shape while they can do so, and before there is any tie-up of the transportation system. It cannot be said that they are looking for increased prices, although bars do look as though they would not stay long at present figures, one Canadian mill al-

ready having announced an increase of $2 per ton.

The Supply Market

There has not been a very brisk selling of small tools during the last week. Nearly all the dealers in this district report that trading was a little off color, and they are at a loss to give any good reason for it. It may be that the fair had interfered largely with business or that the holiday season has not been fully concluded. Business in certain of the establishments that are running to capacity, such as the automobile shops, is good, and buying is satisfactory.

Metals in Demand

The metal situation (non-ferrous) is reported satisfactory. There was just a little doubt as to the course of copper a few days ago, it being held that it was at its peak and was likely to recede. The trade here is not disturbed, electric being quoted at 26c. There is a good demand for the other metals as well, with prices unchanged.

Scrap Market Quiet

Business is fairly good in the scrap metal market, and this is about all that can be said for it. The larger dealers are shipping to the United States market, but only on contract, and no new business is being taken on for the present. It looked last week as though some reductions might be made in certain lines, as there was an apparent weakness in the lists, but this has not taken place. Rather have some places made slight increases.

Copper continues to be fairly strong. There is quite an amount of copper turnings yet in this country, the property of the U.S. Ordnance Department. A certain part of this has been disposed of, but sales have not been made against the entire holdings. As far as the shell steel scrap is concerned, the market has been cleared out, as all that the U.S. Government had stored here has been sold or removed, while that of the British Government has in a large measure been shipped back to Britain.

NOT LIKELY THAT THERE WILL BE ANY STRIKE IN STEEL MILLS AT PRESENT

Special to CANADIAN MACHINERY.

PITTSBURGH, Pa., Sept. 11.—The labor situation in the iron and steel industry is greatly improved. The universal opinion among manufacturers is that a general strike, such as was threatened, is out of the question. There may be sporadic outbreaks, as there have been in the past three months, but there may even be less of that than there was.

At no time was the balance of probability that there would be a strike. At Youngstown it was thought at one time to be "50-50," but Youngstown is the worst place in the country in that respect. It was there that the riots occurred at the beginning of 1916. Now the chances, taking the industry as a whole, are practically insignificant. Of course, no prediction can be made for any length of time, for there may be new developments eventually, but as to this particular strike that the labor agitators have been endeavoring to foment, it would have occurred before this if it was going to occur at all.

There was quite a complication of events, as detailed in last report, with the strike committee seeking to arrange a conference with Judge Gary and threatening strike if the conference were not arranged, at the same time that Samuel Gompers, President of the American Federation of Labor, with his more moderate views, returned to this country, and President Wilson issued his appeal that there be a truce in labor disputes.

The outcome was that the strike committee did not call any strike. Why they did not nobody but the labor people knows. It may have been through realization that calling a strike would not produce a strike, or through Mr. Gompers refusing on general grounds to sanction a strike, or through the issuance of the President's appeal showing that a strike would be ill-timed.

After the hand seemed to be played out the strike committee continued throwing down cards. They secured, under the headship of Mr. Gompers, an interview with President Wilson, seeking to have him endeavor to get Judge Gary into a conference, and then last Friday they sent a long telegram to the President at St. Louis, urging him to arrange a conference, and saying they had great difficulty in restaining their men at various points from striking. All along the Washington press correspondents have had the wrong view of this thing, and they seem to have taken seriously the agitators' bluff that they were having trouble keeping the men from striking. Everywhere else in the country the sun shines through the bluff, which is considered a cheap joke.

It may be taken that the whole matter rests for a time, or at least until after the conference, early in October, that the President has called, to be participated in by 15 men selected by manufacturing and financial interests, 15 labor leaders, and 15 men to be selected by the President himself. The object is to devise a solution for the whole labor matter, so that strikes and lockouts will be relegated, like wars, to the barbaric past. Naturally enough, however, one is inclined to be cynical. There have been great conferences before in Washington, aimed at accomplishing various things. However, the chief trouble is "unrest," time is passing and time has been expected to decrease the unrest.

Production

Production of pig iron at the beginning of September was at the rate of about 34,400,000 gross tons a year, against average rates of 32,650,000 tons in August, and 28,950,000 tons in July. The low point in production was at about the middle of May, since when there has been a constant increase to date. Capacity is about 44,000,000 tons a year, based on what the furnaces actually produced in 1916, working under 1916 conditions, with allowance for new furnaces completed. On that basis production now is at 78 per cent. of capacity, which would indicate 22 per cent. capacity idle. All the idle capacity, however, could not operate if they had a market for their product at present prices, because with wage rates so very high now the furnaces that employ much more labor per ton of iron produced than the generality of furnaces are at a much greater disadvantage than formerly. There was a time when the greater labor employment was more or less balanced by the much smaller capital investment, but the great advance in wages, with decreased labor efficiency, has altogether altered the balance. This might apply to something like 10 per cent. of the capacity, so that there remains a considerable volume of idle capacity that could come in if the orders were available. Such orders are not available, however, since buying now is on a limited scale. Consumers of foundry grades of iron are fairly well covered by contracts to the end of the year. Some of them are buying in a moderate way, finding that their wants are greater than anticipated when they contracted, or having concluded to end the year with a normal stock, when formerly they had counted on having practically no stock. Some sales into next year at advanced prices are reported, but the tonnages are small. There is little demand, and producers prefer to wait until they have a better line on their costs.

Steel Market Quiet

The steel market is quiet, there being only a very limited demand, as to new purchases, while on the other hand the mills have little to offer, being fairly well sold up to the end of the year. If the works that are in operation were producing normal tonnages there would be a good bit of steel available, but at nearly all plants tonnages are unsatisfactory, by reason of slackness on the part of labor. While 90 to 95 per cent. of the productive capacity is in operation, the tonnage output is 80 to 85 per cent., estimating capacities on the basis of what the mills were able to turn out in 1916, when manufacturing conditions were favorable.

Occasionally reports are circulated that this producer or that has advanced one price or another. Such advances, if actually made, are not suggestive of any general advance to come, for the leading producers are strongly opposed to advancing steel prices. On the other hand there is no prospect of any decline while conditions are as they are to-day.

Export Business

Export inquiry for blast furnace and steel mill products is about the same as formerly, which means that it is about

as good as could be expected in view of unsettlement throughout the world and the very unfavorable exchange rates on New York that prevail in several countries. Italian exchange is at a level that makes it the same as if exchange were at par and prices here were 88 per cent. higher than they are. Exchange in France is nearly as bad, and while London exchange on New York is much less distance from par, it is unfavorable enough to cause business to be held back. With a better exchange situation the export demand would be still heavier, but the exchange situation has not begun to improve, and it may get still worse

MATERIAL AND WAGES FAILED TO COME DOWN AS TOOLMAKERS ANTICIPATED

Special to CANADIAN MACHINERY.

NEW YORK, Sept. 11—There has been a lull in machine-tool buying in the East during the past weeks, but the sales results of July and August have been quite satisfactory to a majority of American machine-tool builders. Deliveries have been extended on some lines to October and November, and despite present quietness the situation looks more promising to machine-tool builders and dealers than it has at any time this year. Some solution of the European exchange situation must eventually be found, and when this improvement comes there is bound to be a considerable demand from Europe for American machine tools. A good deal of this busines will come here because adequate financing probably cannot be arranged in any other country. The suggestion of Judge Gary, chairman of the United States Steel Corporation, in a speech at Boston that the dollar be made the basis of international exchange has been the subject of considerable comment in financial and business circles, and doubtless this or some other way will be found to restore the present unbalanced position of the money markets.

Higher prices for machine tools are expected to be announced soon by quite a number of makers. These advances will probably take effect by Sept. 15, and not later than Oct. 1, and will cover several important lines if not all. Machinery manufacturers throughout the United States have agreed that owing to the high cost of labor it will be necesary to make a general advance of from 10 to 20 per cent. This will bring many prices back to the level which prevailed during the war. The cost of machine tools under present labor conditions is from 60 to 80 per cent. labor and from 20 to 40 per cent. material. In many instances, manufacturers reduced their prices at the end of the war in the belief that labor costs would come down at least 25 per cent. This has not happened, but quite on the contrary labor costs have been steadily advancing and hours of work have been shortened in many foundries and machine shops.

The Government is now offering large lots of machine tools for sale through its various district offices, and this fact may be in some degree responsible for the falling off in demand for new tools.

PRODUCERS OF PIG IRON HOLDING IN SOME CASES FOR HIGH 1920 PRICE

BUYING of 1920 iron is meeting with difficulties. This is due to the attitude of producers, who, in many cases are refusing to make any quotations on next year iron. Some business has been closed in the East. Following are reports from U.S. points:

Philadelphia.—Producers are withdrawing from the market, or putting the price of their product on a basis that practically forbids buying. Ferro-silicon from Jackson County is unobtainable on account of labor troubles, and high silicon from Virginia is being used as a substitute. There is little buying. Sales include 500 tons Bessemer by an eastern maker, and 500 tons copper-bearing, low phosphorus at $35 furnace.

Boston.—There has been about 6,000 tons of iron placed during the week for 1920 delivery, but it has been divided among a comparatively few furnaces in small lots. Furnaces which were quoting from first half delivery have withdrawn and will now quote only on last half this year. 2.25 to 2.75 silicon for first half sold at $31.90 delivered. Same quality for last quarter $29 Buffalo.

New York.—Sales amounting to between 15,000 to 20,000 tons for first quarter 1920 have been made during the week. Prices ran from $1 to $2 higher than those for this year. Most of the business was in small lots running not over 1,000 tons. Many furnaces are withdrawing from the market for next year delivery. There is a good export inquiry, but little business is being placed.

Pittsburgh.—There is little transpiring in the market here this week, in fact this is about as quiet a week as has been seen this year. This has had some effect on prices, and 2,000 tons of No. 2 foundry sold at $26.75. Valley furnace is about 50 cents lower than recent quotations. An inquiry for 1,000 tons Bessemer is noted.

Buffalo.—The situation here is affected by the difficulty of obtaining ore. This is thought by furnace men to be only a temporary condition, but furnaces are refusing to quote on 1920 iron while this state exists. A stack that has been down since November last has been blown in.

Cleveland.—The placing of orders to fill up shortages caused by melters underestimating their requirements has caused the moving of a few small tonnages. New business is very slight, producers not wishing to quote for delivery next year, and melters holding back their inquiries till furnace men are ready to offer a price.

Chicago.—Demand holds fairly well here, a good number of melters having to come into the market to make up their requirements. Most of the furnaces are sold out, or nearly so, to the end of the year. Silicon differentials have been increased about $1 on each grade, but the basic grade remains the same. Silveries are in good demand.

Cincinnati.—Enquiries for first quarter delivery are fairly numerous, but producers are not willing to quote on these deliveries. Some malleable has been sold for 1920 delivery at an advance of $2. Car shortage is still causing inconvenience.

St. Louis.—Prices here continue firm, with a good demand for prompt shipment and over last quarter. The $27.75 schedule price with regular silicon differentials is being adhered to by some makers, but cases of shading on the differentials are not unknown. Inquiry for 1920 is represented by requests for 250 tons Southern iron for first quarter.

Birmingham.—Production in the South is increasing, and the market is stiffening too. There are about 26 furnaces now in blast. Fourth quarter delivery is the basis of most of the business being done. There is some inquiry for 1920, but no business being booked.

TRADING REPORTED VERY DULL IN "SCRAP"

THE scrap metal market seems to have struck a period of dull trading. Prices remain firm but are more or less nominal. Following are reports from various U.S. points:

Pittsburgh.—The market is in a dormant state, practically no trading being done. Dealers are not pressing sales and prices remain as they were. Government sales of shell steel have reflected conditions recently, 10,000 tons being sold at $20 to $21 delivered. Pennsylvania road is offering 20,000 tons, including 4,000 gross tons No. 1 steel rails.

Boston.—A quiet market prevails with some grades in fair demand. No. 1 machinery, turnings and borings are among these. Heavy melting steel has brought $16.50 to $17.50 from dealers. On Bessemer screw stock offered by the Government as high as $31 per gross ton was bid. Cotton ties for rebaling have sold up to $14 place of shipment.

New York.—Prices are not very clearly defined in a weak market. Stove plate and heavy melting are off about $1. A lot of 15,000 tons shell forgings were sold this week.

Philadelphia.—A much more confident feeling is evident in the market, due to

Continued on page 292

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$27 15
Lake Superior, charcoal, Chicago	34 60
Standard low phos., Philadelphia	
Bessemer, Pittsburgh	29 35
Basic, Valley furnace	25 75
Toronto price:—	
Silicon 2.25% to 2.75%	$32.75 to $35.75

IRON AND STEEL

Per lb. to Large Buyers	Cents
Iron bars, base, Toronto	$ 4 25
Steel bars, base, Toronto	4 25
Steel bars, 2 in. to 4 in. base	5 50
Steel bars, 4 in. and larger base	6 00
Iron bars, base, Montreal	3 75
Steel bars, base, Montreal	3 75
Reinforcing bars, base	4 50
Steel hoops	5 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	4 40
Chequered floor plate, 3-16 in.	6 50
Chequered floor plate, ¼ in.	6 25
Staybolt iron	8 00
Bessemer rails, heavy, at mill	
Steel bars, Pittsburgh	2 35
Tank plates, Pittsburgh	2 65
Structural shapes, Pittsburgh	2 45
Steel hoops, Pittsburgh	3 05
F.O.B., Toronto Warehouse	
Small shapes	4 50
F.O.B. Chicago Warehouse	
Steel bars	3 62
Structural shapes	3 72
Plates	3 90
Small shapes under 3"	3 62

FREIGHT RATES

	Per 100 Pounds. C.L.	L.C.L.
Pittsburgh to Following Points		
Montreal	33	45
St. John, N.B.	41½	55
Halifax	49	64½
Toronto	27	39
Guelph	27	39
London	27	39
Windsor	27	39
Winnipeg	89½	135

METALS

	Gross.	
Lake copper	$26 50	$26 25
Electro copper	25 50	26 00
Castings, copper	25 50	25 00
Tin	60 00	58 00
Spelter	9 75	10 00
Lead	7 25	7 00
Antimony	10 00	10 50
Aluminum	35 00	35 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ½ up	$ 4 50	$ 4 50
Plates, 3-16 in.	4 90	4 90

Price List No. 38

WROUGHT PIPES

Standard Buttweld		
⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 76
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74
Standard Lapweld		
2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces

WROUGHT NIPPLES

4" and under, 60%.
4½" and larger 50%.
4" and under, running thread, 30%.
Standard couplings, 4" and under, 40%, 4½" and larger, 20%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds. Montreal	Toronto
Copper, light	$16 00	$13 75
Copper, crucible	19 00	18 00
Copper, heavy	19 00	13 00
Copper wire	19 00	18 00
No. 1 machine composition	17 00	16 75
New brass cuttings	13 00	10 75
Red brass cuttings	15 00	14 75
Yellow brass turnings	10 00	9 00
Light brass	8 00	7 00
Medium brass	9 00	7 75
Scrap zinc	6 00	6 00
Heavy lead	5 00	5 25
Tea lead	3 75	3 50
Aluminum	21 00	18 00
	Per Ton.	Net
Heavy melting steel	13 50	13 50
Shell turnings	7 00	6 00
Boiler plate	13 50	11 00
Axles (wrought iron)	20 00	20 00
Rails	14 50	13 50
Malleable scrap	15 00	17 00
No. 1 machine cast iron	23 00	18 00
Pipe, wrought	10 00	5 00
Car wheels	20 00	20 00
Steel axles	20 00	20 00
Mach. shop turnings	6 00	6 00
Stove plate	17 00	13 00
Cast boring	7 00	8 00

BOLTS, NUTS AND SCREWS

	Per Cent
Carriage bolts, ⅜" and less	35
Carriage bolts, 7-16 and up	15
Coach and lag screws	50
Stove bolts	65
Wrought washers	50
Elevator bolts	25
Machine bolts, 7-16 and over	40
Machine bolts, ⅜" and less	40
Blank bolts	25
Bolt ends	25
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	net
Machine screws, o. and fil. hd., brass	net
Nuts, square blank	add $0 75
Nuts, square, tapped	add 1 00
Nuts, hex., blank	add 1 00
Nuts, hex., tapped	add 1 25
Copper rivets and burrs, list less	15
Burrs only, list plus	25
Iron rivets and burrs	40 and 5
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, O. & R., bright	75
Wood screws, flat, bright	77½
Wood screws, flat, brass	55
Wood screws, O. & R., brass	55½
Wood screws, flat, bronze	50
Wood screws, O. & R., bronze	47½

MILLED PRODUCTS

(Prices on unbroken packages)

	Per Cent.
Set screws	50
Sq. and Hex. Head Cap Screws	45
Rd. and Fil. Head Cap Screws	20
Flat But. Hd. Cap Screws	10
Fin. and Semi-fin. nuts up to 1 in.	45
Fin. and Semi-fin. nuts, over 1 in., up to 1½ in.	40
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	25
Studs	30
Taper pins	50
Coupling bolts	10
Planer head bolts, without fillet, list	10
Planer head bolts, with fillet, list plus 10 and	net
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	net
Collar screws	list plus 20,
Thumb screws	40
Thumb nuts	75
Patch bolts	add 20
Cold pressed nuts to 1½ in.	add $1 00
Cold pressed nuts over 1½ in.	add 2 00

BILLETS

	Per gross ton
Bessemer billets	$38 50
Open-hearth billets	38 50
O.H. sheet bars	42 00
Forging billets	51 00
Wire rods	52 00

Government prices.

F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$4 70
Cut nails	4 75
Miscellaneous wire nails	60%
Spikes, ⅝ in. and larger	$7 50
Spikes, ¼ and 5-16 in.	8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	net

MISCELLANEOUS

Solder, strictly	$ 0 34
Solder, guaranteed	0 39
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls., gal.	1 50
Linseed oil, raw, single bbls.	2 90
Linseed oil, boiled, single bbls.	2 92
Plaster Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	List plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

S.S. drills, wire sizes up to 52	40
S.S. drills, wire sizes, No. 53 to 80	50
Standard drills, all sizes	50
3-fluted drills, plus	10
Jobbers' and letter sizes	50
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	50
Sleeves	50
Taper pin reamers	net
Drills and countersinks	list plus 10
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	10 to 40
Canadian high speed cutters	net
American	plus 40

COLD ROLLED SHAFTING

At mill list plus 5%
At warehouse list plus 25%
Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 6 55	$ 6 00
Sheets, black, No. 10	5 15	5 45
Canada plates, dull, 52 sheets	8 50	7 10
Can. plates, all bright.	8 50	8 00
Apollo brand, 10¾ oz. galvanized		
Queen's Head, 28 B.W.G.		
Fleur-de-Lis, 28 B.W.G.		
Gorbal's Best, No. 28		
Colborne Crown, No. 28.		
Premier, No. 28 U.S.		7 50
Premier, 10¾ oz.		7 80
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

(Warehouse Price)

B

¼ in., $13.50; 5-16, $11.50; ⅜ in., $10.50; 7-16 in., $9.30; ½ in., $10.15; $13.00; ⅞ in., $9.60; ¾ in., $9.70; ⅝ in., $9.95; 1 in., $9.50; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $16.75; 3-16 in., $15.40; ¼ in., $14.20; 5-16 in., $11.50; ⅜ in., $10.50; 7-16 in., $9.30; ½ in., $10.50; ⅝ in., $10.00; ¾ in., $9.70.

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	27½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50
Great Western-American	50
Kearney & Foot, Arcade	50

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$25 00	$.....
1¼ in.	27 00	
1½ in.	28 00	26 00
1¾ in.	30 00	26 00
2 in.	30 00	26 00
2¼ in.	33 00	28 00
2½ in.	40 00	32 00
3 in.	46 00	38 00
3¼ in.		45 00
3½ in.	56 00	42 00
4 in.	70 00	54 00

Prices per 100 ft., Montreal and Toronto

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal., bulk	22½
Palacine	25½
Machine oil, per gal.	36
Black oil, per gal.	16
Cylinder oil, Capital	62
Cylinder oil, Acme	45
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil, antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil, bbls. net	8

BELTING—No 1 OAK TANNED

Extra heavy, single and double	30%
Standard	30, 10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices per lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS—Warehouse Price

Brass rods, base ½ in. to 1 in. rod	0 34
Brass sheets, 24 gauge and heavier, base	$0 42
Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

WASTE

XXX Extra	19½	Atlas	17
Peerless	19	X Empire	15½
Grand	18	Ideal	16
Superior	18	X Press	14
X L C R	17		

Colored

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers

Select White. 11 Dark colored. 09
Mixed colored. 10

This list subject to trade discount for quantity.

RUBBER BELTING

Standard ... 10% Best grades ... 15%

ANODES

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices per lb.

COPPER PRODUCTS

	Montreal	Toronto
Bars, ½ to 2 in.	$42 50	$43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers', in sheets, 6 x 4 base	45 00	44 00

LEAD SHEETS

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$10 25	$11 50
Sheets, 3½ lbs. sq. ft.	10 00	11 00
Sheets, 4 to 6 lbs. sq. ft.	9 75	10 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS

Acid, boracic	$.25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.15
Ammonium, carbonate	..
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.25
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	.75
Potassium sulphide (substitute)	2.25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	.80
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated

THE SCRAP MARKET

Continued from page 289

the idea that labor troubles are finally settled. Machine shop turnings have brought $15, on a lot of around 5,000 tons. Stove plate was sold at $21 delivered.

Buffalo.—Sales have been few, but prices are holding firm. Mills are using up stock from their reserve, and if the labor situation was clearer buying would become free again.

Cleveland.—As users pretty well stocked up on the recent buying movement, there is little strength to the market just now. Dealers believe that the depression will soon be over and the more favorable outlook for the labor situation inclines to optimism.

Chicago.—The market here has succumbed to adverse influences and has become comatose. The combination of holidays and threatened strike proved too much for business that was weak already. The only railroad offering is 2,200 tons by the Chicago and Northwestern.

Cincinnati.—The tendency is towards weakness, and especially in heavy melting. Cast borings are off about 50 cents a ton. Prices on other grades do not represent real quotations.

Birmingham. — Although consumers are offering better prices for heavy melting they are still $3 below the dealers' demand. No. 1 cast is in good demand and a little more life is apparent generally. Prices are stiffening on most grades.

MONTREAL NOTES OF THE WEEK

The Montreal officials and staff of the Canadian Export Paper Company, to the number of about fifty, spent a pleasant holiday on Labor Day at Grand Mere, Quebec, as the guests of the Laurentide Company, Limited.

* * *

Montreal citizens are again confronted with an advance in tram fares, the most recent demand on the people going into effect on the 15th of the month. The basis of the new rates will be a 7 cent cash fare, or 4 tickets for 25 cents.

* * *

Jenkins Bros., Montreal, have recently obtained a large order for valves from Cuba. It has been learned that considerable business in this connection is developing from South America and the West Indies. Plenty of shipping space is available for export in this direction.

* * *

Clarence I. de Sola, the Belgian Council in Montreal, has been honored with the Belgian knighthood by King Albert, being created Chevalier of the Order of Leopold in recognition of his valuable services to Belgium during the war. This title is the highest in the power of the Belgian monarch to bestow.

* * *

The municipal authorities of Sydney, N.S., have drafted a resolution for presentation at Ottawa, asking that a Royal Commission be appointed at once to probe the situation surrounding the closing down of the steel plant. The city is desirous of knowing when the works will be reopened, as many of the skilled workers are leaving the city.

* * *

Owing to the delays in sailings of passenger and mail steamers, caused by the labor troubles in British ports, the Canadian and British Governments are utilizing fast freighters for the transmission of mails. Recent fogs have held up some passenger boats as long as 50 hours, lengthening the journey from port to port to about 9 days, the time taken by a fast cargo vessel.

* * *

A record for quick loading of a cargo vessel has just been made at the port of Montreal, when the McLean-Kennedy freighter S. S. Alston was completely loaded with 7,000 tons of general cargo in 2½ days. It is generally conceded that Montreal port clears vessels two days quicker than New York or Philadelphia, but this recent loading is an outstanding achievement for vessel loading.

* * *

From a statement recently made by an official of the Canadian Pacific Ocean Service, there is every reason to believe that there is plenty of space available for the export of Canadian products. As a matter of fact, many shipping firms are looking for cargoes, and it would appear that the cry of exporters of lack of shipping space, due to the requirements of the Ministry of Shipping, is not warranted.

* * *

The Fraser, Brace Shipyards are deepening the basin in which they have recently been constructing wooden vessels for the Imperial Munitions Board and the French Government, and intend to make the present location into a permanent dry dock for the repairs and building of lake vessels. It is likewise possible that a plant will be erected for the construction of steel vessels for lake service; negotiations are now on for work of this character.

* * *

Announcement has been made that the plans and specifications for the new dry dock for Louisburg harbor have recently been completed and that they are now before the Federal Government for approval. When this has been given it is expected that work will be commenced at the earliest possible moment. About 800 men will be employed in the construction of the work. English capital is largely interested in the development.

* * *

The Montreal General Tool Company are now manufacturing the "Victory" water heating system, and they have constructed a system at the factory for demonstration purposes. They will carry on this new development in conjunction with their line of Talbot boilers, which are oil-fired. They have already obtained a large contract for installation in a new church to be erected in Notre Dame de Grace. This will be the first installation of its kind in Canada the fuel being crude oil.

* * *

W. A. Downing has accepted a position as sales manager with the Cutter and Wood Supply Company, of Boston, Mass. For the past three and a half years Mr. Downing has been associated with the Geo. F. Foss Machinery and Supply Co., of Montreal, in the joint capacity of manager of the small tool department and general advertising. Prior to his connection with the Foss organization he specialized in small tool equipment, acting in various capacities with many of the leading American can manufacturers.

* * *

A. G. Clark, who has been accountant for the Geo. F. Foss Machinery and Supply Co. for the past five years, will succeed W. A. Downing as manager of the small tool department

* * *

A remarkable and commendable record for rehabilitation has been made by the Canadian Pacific Railway, as official reports up until the end of August show that this company has more returned men now employed than left the company for service overseas. The total number of men reported as joining the army was 10,538, and of this number over 1,000 have died, nearly 2,000 were wounded, and 5,024 have been re-employed. In addition to this 5,543 soldiers have been given employment who were not previously working with this company. This makes a total of returned men now working with the C.P.R. of 10,567. The policy of the company has been to re-engage the men in positions equally as good as the ones they left, and wherever possible the men are taken back to the same jobs that they had prior to enlisting, or others of a similar character.

Organization of Traders.—The Canadian Association of British Manufacturers and their representatives held their first meeting at the King Edward Hotel, Toronto, within the last few days. The membership is composed of between 300 and 400 British firms at present, but a drive will shortly be made to secure additional members. The meeting was presided over by John Wilson, who said in his address that in the opinion of some of the more optimistic members, the association was likely to become as influential as the Canadian Manufacturers' Association.

Industry for Sarnia.—The Loughead Machine Shop here has been purchased by the Seagrave, Ltd., manufacturers of motor trucks and firefighting apparatus. The new concern, which has several establishments in the U.S. and Canada, will be capitalized at $200,000, one quarter of which will be open to local investors.

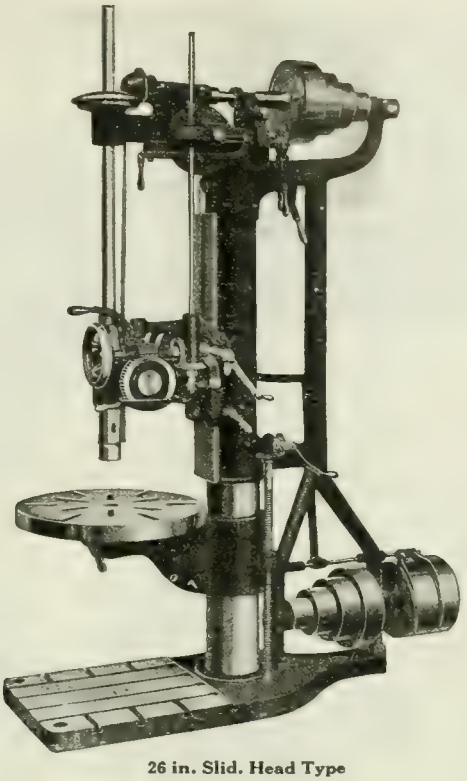
A Complete Line 8 in. to 50 in. Swing.
with or without tapping attachment.

BARNES

Upright Drills
Horizontal Drills
Gang Drills

Accuracy—Strength
Convenience of Operation

Carried in Stock by



26 in. Slid. Head Type

THE A.R. WILLIAMS MACHINERY CO., Ltd. 64 FRONT ST. WEST TORONTO

MONTREAL ST. JOHN, N.B. WINNIPEG VANCOUVER HALIFAX BUFFALO, N.Y.

Acid Electric STEEL CASTINGS

Acid Electric Steel Castings show superior ability to resist wear and crystallization. They are smooth in texture, free from Blow Holes, and machine perfectly. We specialize in

Railroad and Other High Grade Castings

up to 15 tons, any specification. Electric Steel Castings COST NO MORE than ordinary Steel Castings.

Prices on Application—Prompt Deliveries

The Thos. Davidson Mfg. Co., Limited
Steel Foundry Division, Lachine Canal
Head Office: 187 Delisle St. MONTREAL
Phone Victoria 1492

MORROW SCREWS MORROW

Don't Just Say "Drills" Say "MORROW" Drills

on your next requisition.
More drilling and less re-grinding.
More holes in the work and less in the temper.
More accomplished and less regretted.

It pays to specify
"MORROW"
Drills

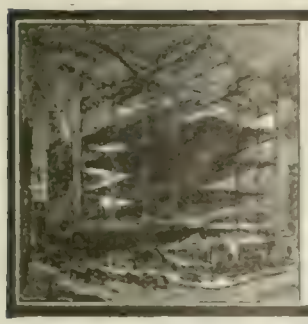
We also manufacture
"MORROW" Set Screws
"MORROW" Cap Screws
"MORROW" Nuts
and are Sole Distributors of "P. H." and "IMPERIAL" Files.

John Morrow Screw & Nut Company, Limited
Ingersoll - Ontario

Ingersoll Files Are Good Files

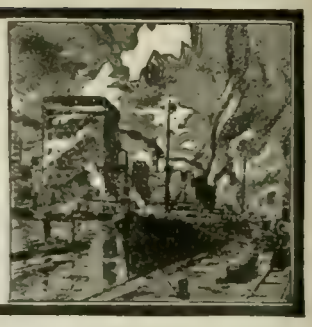
DRILLS FILES

MORROW NUTS MORROW



INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS PERSONAL AND TRADE NOTES



TRADE GOSSIP

New Brantford Factory.—A building for the purpose of manufacturing small motors and electric fans will be put up in Brantford by the Robbins & Meyers Co., of Springfield, Ohio.

Wants Information.—J. L. Perry, lumberman, of Westchester, Nova Scotia, wants to secure catalogues and literature from Canadian firms dealing in mill or woodworking machinery.

Oil Fire at Halifax.—The stills of the Imperial Oil Company at Woodside, opposite Halifax, were visited by fire, but fortunately it was extinguished by the company's own fire-fighting force before much damage was done. The company have a very large plant at Woodside, covering many acres of ground.

Motor Fuel for France.—Germany has to supply France with 30,000 tons of benzol annually under the Peace Treaty. The Government committee on petroleum proposes that this benzol shall be mixed with alcohol in the proportion of half and half, making a cheap national fuel suitable for car, truck or tractor.

Sugar for Canada.—There are four of the Canadian Government merchant fleet at present loading or on their way to this country with sugar. The total amount to be brought in during September will be 12,400 tons. The total for the season will be 32,000 tons. Almost all of this sugar is brought from Cuba.

Choice of Buildings.—The ratepayers of London will vote in January next on the question of spending $700,000 on an enlarged City Hall or build a $250,000 office building on the site of the temporary City Hall. The Mayor favors the office building, as, he says, the present day trend is towards municipal buildings for purely utilitarian purposes.

Up in the Air.—Through a strike of firemen operating the light, heat and power plant of the fifty-storey Metropolitan Life Insurance building, the occupants were cut off from communication with the ground except by means of the stairs. This lasted for about an hour, when a crew of strike-breakers were secured to take care of the 5 o'clock exodus.

Profitable Year for Municipal Line.—The auditors employed on the London & Port Stanley Railway have nearly completed their work, and it is understood that the result of the year's working will prove eminently satisfactory. This line, which is looked on as a kind of model for the proposed Hydro Radial lines, is keenly observed by the whole province.

Big Deal in Oil Stock.—The Commonwealth Petroleum Corporation, a newly-formed New York syndicate, has acquired the interests of Andrew Weir, now Lord Inverforth. Lord Inverforth was one of the largest shareholders in the Union Oil Company of California. The number of shares held by him was 37,500, which the Commonwealth Corporation bought at the rate of $160 per share, a total price of $6,000,000.

To Urge 36 Hours a Week.—The delegates of the Trades and Labor Council of Vancouver, recently organized by the international unions, are about to attend the conference of employers and employees at Ottawa. Their platform will consist of a demand for a 36-hour week, recognition of labor unions and collective bargaining, and the establishment by the various provinces, and not by the Dominion, of a minimum wage.

Britain and Canadian Cheese.—The British Ministry of Food has cabled the Canadian Government, stating that the Food Controller in Britain has definitely decided not to purchase the balance of this season's cheese after 20,000 tons have been secured. Any Canadian cheese imported into Britain after that will be governed by the maximum importers' selling price, as fixed by the British Government, which is at present 28c per pound.

The Victor Tool Co., Waynesboro, Pa., have recently made connections with the J. R. Stone Tool & Supply Company, 997 Woodward Ave., Detroit, Michigan, appointing them exclusive agents for the State of Michigan. They will handle the entire line of self-opening die heads, collapsible and adjustable taps, reamer holders and nut facing machines, and will carry a stock of these tools in their Detroit office in order to serve the trade promptly.

Labor Bodies Federate.—The labor interests in Brantford got together and held a meeting at which it was decided that the metal trades council, the Independent Labor party, and the various trade unions in the city will co-operate for political and other purposes. The Grand Army of Canada and the Great War Veterans were invited to affiliate with the labor men, and in the event of their constitutions preventing this, the invitation was extended to individual members of these bodies.

New Contracts.—A contract has just been concluded by the Department of Marine with the Collingwood Shipbuilding Co. for the construction of two ships of 3,750 tons each for the Canadian commercial fleet. The price is $180 per ton. Four similar ships were built by this company in war time, and the price then was $205 per ton. A contract has also been concluded with the Dominion Shipbuilding Co., of Toronto, for two ships of 3,500 tons each at the same price, $180 per ton. The above are the only contracts arranged for at present.

Drop of Nickel Output—The mineral production record of Ontario shows a decrease since the signing of the armistice. In the first half of this year the production of nickel matte dropped to 7,072 tons, as compared with 21,393 tons in 1918. The shrinkage of prices brought the value of the output down from $12,385,950 in the first half of 1918, to $3,535,915 for the first of 1919. A decrease was also noted in copper matte and silver, the latter being due to smaller output. The estimated value of all minerals was $18,759,000, as compared to $31,574,000 in the first half of 1918.

Vanadium Steel Co.—The "Financial Review" of August 30 says: The most active issue on the N. Y. Curb during the week has been the Vanadium Steel Company of America. This company has secured through purchase the mines and other physical properties of the American Vanadium Company. J. Leonard Replogle, Charles M. Schwab and Allan A. Ryan & Company, were the actual purchasers. The board of directors will comprise the above and T. Coleman du Pont and Harry Payne Whitney. Capital stock is 280,000 shares of no par value. This corporation controls about 95 per cent. of all vanadium produced. The Ford Motor Company is one of its largest customers. Mr. du Pont is interested in the General Motors Company and A. A. Ryan & Company, in the Stutz Company. The shares are quoted around $39.

MARINE

Port Colborne.—The tug Alert, which was sunk and turned bottom upward recently near Port Robinson in about 25 feet of water, was successfully raised by the Lebeau Wrecking Company and taken to Port Dalhousie for repairs.

St. John, N.B.—The St. John Dry Dock and Shipbuilding Company have purchased the dredge "Leaconfield." This vessel was formerly owned by E. O. Leahay and will be employed by the dry-

GEOMETRIC

Adjustable Collapsing Taps

Have overcome all the expense and annoyance of tapping screw threads with a solid tap.

Anyone doing thread tapping knows what backing out a solid tap each time means. It usually means low production, poor threads, and worn out taps.

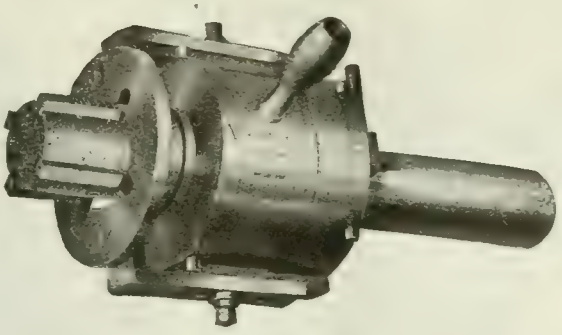
The mechanism of the Geometric Taps takes care of adjustment to correct diameter each time a thread is tapped, it collapses the chasers automatically, leaving a thread clean cut and perfect.

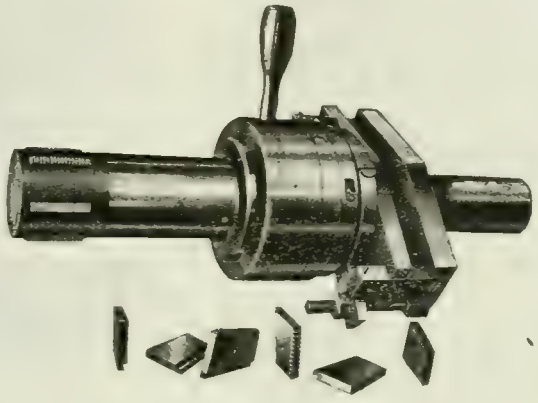
The chasers are readily reground, and when finally used up, are renewed at comparatively small cost, leaving the tap as efficient as when new.

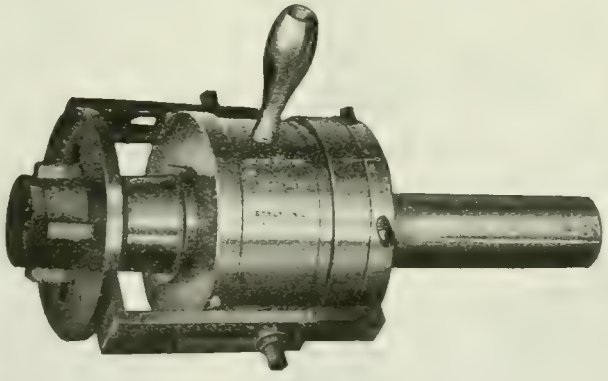
The manufacturers of the Geometric line of Collapsing Taps and Self-opening Die Heads are justly proud of the distinction which is theirs:—

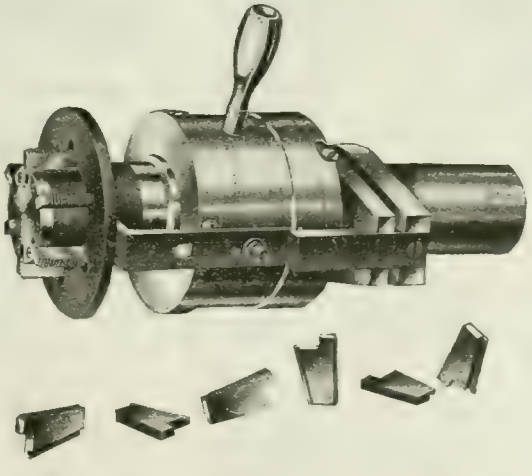
The Originators
and the
Largest and Best Known Manufacturers
of
Automatic Threading Tools

For cutting all classes of screw threads, internal and external, of any diameter and form.









The Geometric Tool Company
New Haven, Conn., U.S.A.

CANADIAN AGENTS:
Williams & Wilson, Ltd., Montreal; The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg and St. John, N.B.



"HAWK VANADIUM"
TOOL STEEL

Remarkable in its glass Hardness, Toughness and Cutting Efficiency.

Will give twice the cut of a regular tool steel at one grinding.

Order "Hawk Vanadium" for your End Mills and cutters. Once known—always used.

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OF EVERY DESCRIPTION
SEND US YOUR ENQUIRIES

Wanted representing agents and merchants to sell and represent firm manufacturing Milling Cutters, Twist Drills, Reamers, Lathe Tools, Planer Tools, High Speed Steel and Alloy Tools, and Merchants' Tools. Good terms and discounts for selling or representing offered. Apply Lawton Bros., Woodseats Engineering Works, Sheffield, England. c13m

WHEN ANSWERING ADVERTISEMENTS KINDLY MENTION NAME OF THIS PAPER



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The only fountain with a bowl that prevents lips touching the bubbler paid its moderate cost over and over in all those well ordered plants whose precautionary measures successfully barred the Spanish influenza. PURO saves lives, time and water. Write

Puro Sanitary Drinking Fountain Co.
147 University Ave., Toronto, Canada

dock company on excavation work in connection with their operations.

Toronto. — The Canadian Government now has fourteen vessels carrying Canadian produce and manufactured articles all over the globe, and before the winter is over expects to have thirty-one vessels in commission. The operating policy of these vessels is to make them supplemental to private tonnage, and not a competitive one.

St. Catharines.—The "Dalhousie City" was unable to make her usual trip to Toronto from Port Dalhousie owing to propeller trouble. The dry dock at Port Dalhousie was engaged, preventing her being put in there for examination. Failing the necessary repairs being carried out expeditiously another steamer will be engaged to carry on the run.

SYDNEY, N.S.—A new drydock for the harbor of Louisbourg will be started by the beginning of 1920. The dock will cost $5,000,000 and the capital interested will be mostly English. Plans and specifications have been placed before the Federal Government, and the signing of a subsidy contract is all that is necessary, previous to work being commenced.

London.—The firm of Harland & Wolff are still expanding. They have now acquired two more yards on the Clyde, those of D. & W. Henderson Ltd., and A. & J. Inglis. They recently acquired the yard of Caird & Company, and are said to be interested in other Clyde yards. They are now strongly entrenched in Liverpool, Southampton, on the Clyde, and at their original works at Belfast.

New York.—Captain W. Hays, of the famous "Olympic," is coming to the States to enjoy a vacation on a New Jersey farm. Capt. Hays wears the Distinguished Service Medal for the services he performed in his gallant ship. She transported 250,000 troops, bagged five German submarines, and travelled 350,000 miles without convoy and without accident.

Ogdensburg.—The crew of the steamer "Toltec," of Buffalo, were landed at Ogdensburg by the Canadian Government steamer "Alert." The "Toltec," which was a wooden vessel, was on a voyage from Montreal to Buffalo in ballast, when fire broke out in the engine room. It spread so rapidly that nothing could be done to suppress it, and the vessel was beached near Prescott. The "Toltec" was owned by the O'Hagen Co., of Detroit.

Montreal.—The "Lake Fibre," built at Toledo, is now in Montreal loading a cargo of Canadian food products for Glasgow, Liverpool and London. The "Lake Fibre" is under the control of the United States Shipping Board and is one of the smallest of the ocean-going boats built on the lakes. She is of 1,588 tons net register, and her deadweight capacity is only 2,500 tons. She is fitted with oil-fuel and her winches are driven by gasoline engines.

Improvements at Water Front — The Toronto Harbor Commission have under consideration the construction of improving the harbor facilities in front of the Exhibition grounds. The idea is to construct a retaining wall at which ferry boats could land passengers from the city, and embark returning visitors for transportation to the city. The chief engineer will present a report shortly on the probable cost of the undertaking.

Montreal.—That there is plenty of cargo space available for shipments going to England is the statement of shipping company's officials. According to these gentlemen shipowners are looking for cargoes, and they are at a loss to find any explanation for the cry that has been going up about lack of space. The British Ministry of Shipping has cabled Canadian offices that they expect to be

PATENTS FOR SALE

Two Canadian Patented Steam Specialties for sale; one Steam Trap, Patent Number 187215, and one Steam Separator, Patent Number 183340.

Allentown Experimental Works
Allentown, Pa., U.S.A.

Mining Machinery for Sale

Alley & McLellan Air Compressor 600 ft. at 100 lbs. pressure, 125 H.P. Motor, heavy duty 600 R.P.M. 3 phase 60 cycle 550 volts.
Ingersoll-Rand 800 ft. Air Compressor.
1 Tube Mill Fraser & Chalmers 5 x 22.
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Also large assortment of Pumps, Tanks, Classifiers, Boilers and Mining Equipment for sale.

Zenith Coal & Steel Products
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402 McGill Building Montreal
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satisfied with 50 per cent. space instead of the 60 per cent. they have been using.

Halifax.—Work at the Halifax shipyards is being carried on vigorously. The office and stores building are completed as far as the exterior work is concerned,. The concrete retaining wall is being rapidly completed and the bridge over the railroad tracks to give access to the dock and shipyard is now floored and the sidewalks put in. A flight of steps will lead from this bridge to the north ferry. The steamer ferry "Scotia" is in the dry dock receiving an additional fifteen feet to her deck.

Kingston.—The "Cabotia," which went ashore on the Main Ducks, about 500 yards from the lighthouse, is in about 12 feet of water and resting on rock. She is a total wreck, being full of water, and her stern opened up very badly. The Donnelly Wrecking Co.'s steamer Cornwall hastened to her assistance when she first went ashore, but owing to the high seas could not get alongside of her for some hours. She then took off the captain and crew and such equipment as could be readily handled. The cargo will be salved as soon as arrangements are made with the underwriters.

PERSONALS

Byron F. Stowell, for many years connected with the Hendee Mfg. Co., of Springfield, Mass., as master mechanic and mechanical engineer, is now associated with the Napier Saw Works, Inc., of Springfield, Mass., as mechanical engineer.

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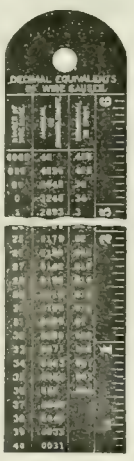
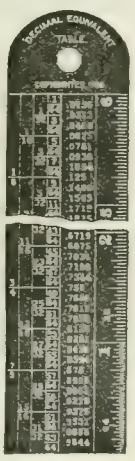
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MACHINE WORK WANTED FOR LATHES, shapers, milling machine and planer, etc. Hourly or contract basis. Prompt delivery. W. H. Sumbling Machinery Co., Toronto. (ctfm)

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MOTOR AGENCIES — A FIRM OF MOTOR engineers in London, England, is open to take the sole English agency for a good Canadian make of motor car. Representative of the firm is shortly coming to Canada. Apply Box 626, Canadian Machinery. (c12m)

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TORONTO PATTERN WORKS, 65 JARVIS Street, Toronto. Patterns in wood and metal for all kinds of machinery. (cfm)

BRANTFORD PATTERN WORKS ARE PREpared to make up patterns of any kind—including marine works—to sketches, blue prints or sample castings. Prompt, efficient service. Bell 'Phone 631; Machine 'Phone 733. Brantford Pattern Works, 49 George St., Brantford, Ont. (ctfm)

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The goods in question for the past 14 years have had large and continuous sales (increasing each year) all over the U.K., the Continent, Australia, New Zealand, and the Far East, etc., and are suitable for those **already doing business** with iron and steel foundries, general and heating engineers, gas works, dry docks, shipyards, etc.

Live Firms of good standing **can only be considered.** To save time write fully to

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Canadian Agents for high grade line of Annealing Furnaces

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Box 624
Canadian Machinery

BRASS ROD For Sale

At a Very Attractive Price

Free Turning

Round Brass Rod

Mill lengths of the following sizes:—		Diameter
30,000 lbs...	.250"	¼"
24,500 lbs...	.533"	Abt. .17/32"
62,500 lbs...	.625"	⅝"
73,250 lbs...	.750"	¾"
27,500 lbs...	.9375"	15/16"
46,750 lbs...	1.000"	1"
45,000 lbs...	1,250"	1¼"
26,000 lbs...	1.375"	1⅜"
39,000 lbs...	2.000"	2"

Above is all new material stored at the manufacturers' plant in Connecticut, ready for prompt shipment and has passed Government inspection. Address Box 625 Canadian Machinery.

Used Machinery For Sale

1—16" Shaper.
1—20" Shaper.
1—24" Shaper.
1—No. 1½ Cincinnati Universal Miller.
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1—22" x 10' Engine Lathe.
1—24" x 10' Engine Lathe.
1—24" x 40" x 20' Gap Lathe.
1—10,000-lb. Olsen Testing Machine.

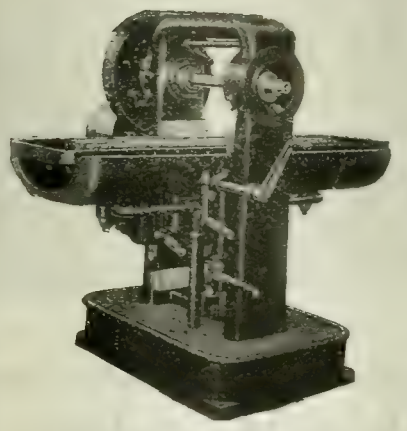
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1—"Used" Plate Punch and Shear 36" gap, capacity ⅞" hole in ⅞" plate
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1—"Used" Air Compressor, steam actuated — compound steam—simple air —12" x 12" cylinder.

Both machines must be modern in design and in good operating condition. Offers with full details, price and shipping point, will be considered.

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In the **Weston-Mott Co.**, Flint, Mich., Gooley & Edlund finished 2,500 parts in 10 hours. Cutting depth of 15/16" in 6 cuts. Allowable error being only .005".

National Twist Drill Co. vouches for **Briggs Millers,** using 10 to 12 cutter blanks at a time, ¾" face, 2¼" diameter, 20 teeth to the blank, one production averages 50 to 55 blanks in 10 hours.

This is easy for the Briggs. Its rigid, bridge-like arbor support enables it to drive any cutter through the metal at top speed.

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7	General Electric	550	5 x 4½ in.	Gen. Electric
7½	Fairbanks-Morse	350	8 x 10 in.	Fairbanks-Morse
10		525	5½ x 5 in.	
15	Western Electric	840		Fuller Co.
25	United Electric	325	8 x 10 in.	Robb-Armstrong
30	Westinghouse	370	9 x 15 x 9 in.	Westinghouse
50	Bullock	275	125 H.P.	Phoenix
50	General Electric	275	12 x 12 in.	Payne
52	Bullock	300	13 x 12 in.	Armington-Sims
62½	Westinghouse			Robb-Armstrong
75	Westinghouse	750		Robb-Armstrong
150	Crocker-Wheeler	225	18 x 17 in.	Harrisburg-Fleming
150		425	225 H.P.	Belliss & Morcom
200	Western Electric		16 x 24 x 24 in.	Robb Engin'g
		220 250	VOLTS:	
60	Thompson-Ryan	275	13 x 12 in.	McEwen
62½	Westinghouse	275	9 x 16 x 12 in	Ide
75	Allis-Chalmers-Bullock	275	11-18 x 11 in.	Shepherd
75	Crocker-Wheeler	275		Fleming Harrisburg
75	Bullock	275	13 x 14 in.	Robb-Armstrong
130	Crocker-Wheeler	225		Buffalo Twin
150	Fort Wayne	185	16 x 24 in.	Diesel
150	Can. Gen. Electric	230	17 x 16 in.	Leonard
160	Bullock	160	16 x 24 in.	Diesel
175	Thompson-Ryan	200	19 x 20 in.	McEwen
200	Gen. Electric	150	20 x 24 in.	McIntosh-Hemphill
250	Westinghouse	200		Phoenix
500	Fort Wayne	90	22-38 x 48 in.	Bates
850	Westinghouse	80-90	20½ x 44¾ in.	Allis-Chalmers
		500 550	VOLTS:	
300	Thompson-Ryan	150	24 x 22 in.	McEwen
500	Westinghouse	90	30 x 48 in.	Cooper-Corliss

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We manufacture the following tools, etc.

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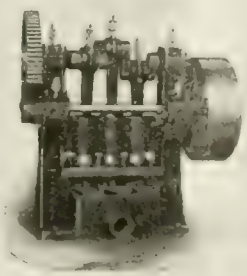
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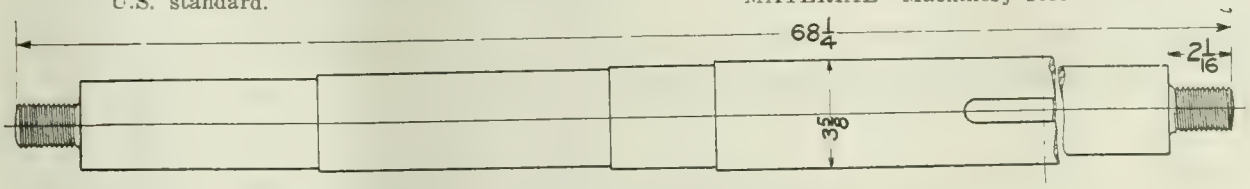
Smalley-General

THREAD MILLING MACHINES

Will give you a short cut to lower-cost thread milling.
Study the blue print and time study as given below.

MACHINE—Smalley-General Thread Miller No. 2.
THREAD—1½ in. diameter, 2 1-16 length, 6 pitch U.S. standard.

PIECE MILLED—Axle for tractor.
MILLING FEED—4.35 per minute.
MATERIAL—Machinery steel.



Tractor Axle Operation
TIME STUDY.

5 minutes 37 seconds floor to floor milling both threads. Each thread milled in 65 seconds. Balance of time handling. Barker 3-jaw chuck used which had 12 in. unsupported overhang turn main spindle bearing to thread.

NOTE.—These parts were chucked through the rear end of main spindle. This was an awkward operation because the pieces were larger in the centre and the type of chuck would not let them through. A collet chuck with false collets would have permitted faster chucking.

Consult us on every phase of Thread Milling.

We will show you how to cut the costs.

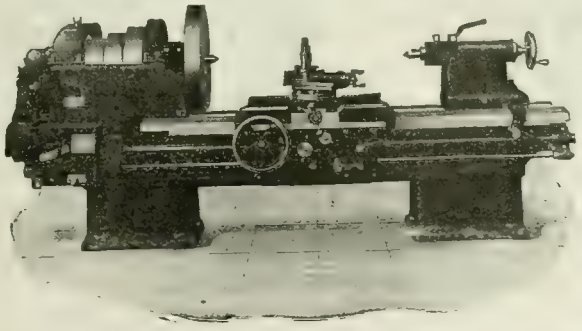
Smalley - General Co., Inc., Bay City, Michigan

Canadian Agents: Rudel-Belnap Co., Ltd., Montreal and Toronto

SIDNEY

Sidney for Service

Sidney-for-Service Lathes are noted for their power and rigidity. Take deep cuts through toughest metal without pause or chatter.



Specifications include 3-step cone, double back gear, semi-quick change gear lathe, built on 10 ft. bed. This lathe also furnished with quick-change gears. Bed lengths available: 10, 12, 14, 16, 18 and 20 feet.

The Sidney Line comprises 15-inch, 17-inch, 19-inch, 25-inch, 27-inch, 30-inch and 36-inch lathes, which are adaptable to the finest tool room work or the heaviest duty shipyard or factory rapid production work.

Heavy Duty Engine Lathes

The Sidney Tool Company, Sidney, Ohio

Canadian Agents: The Geo. F. Foss Machinery & Supply Co., Montreal, Quebec. H. W. Petrie, Limited, Toronto, Ontario.

Have You Noticed?

In any conversation that is fairly general, some firebrand slashes out with condemnations right and left. What he says is interesting, but it isn't informing. Usually there is at least one man present who listens to the general villification thus started and then quietly brings out a point which causes all to pause and think.

This is the man with the balanced viewpoint—the man who gets to the bottom of things before condemning—who takes notice of the various influences at work.

It is this balanced viewpoint which is presented in the editorials of
THE FINANCIAL POST

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Careless Methods of Manufacturers.
A Good Man Gone Wrong.
Dr. McFall's Profiteering Charges.
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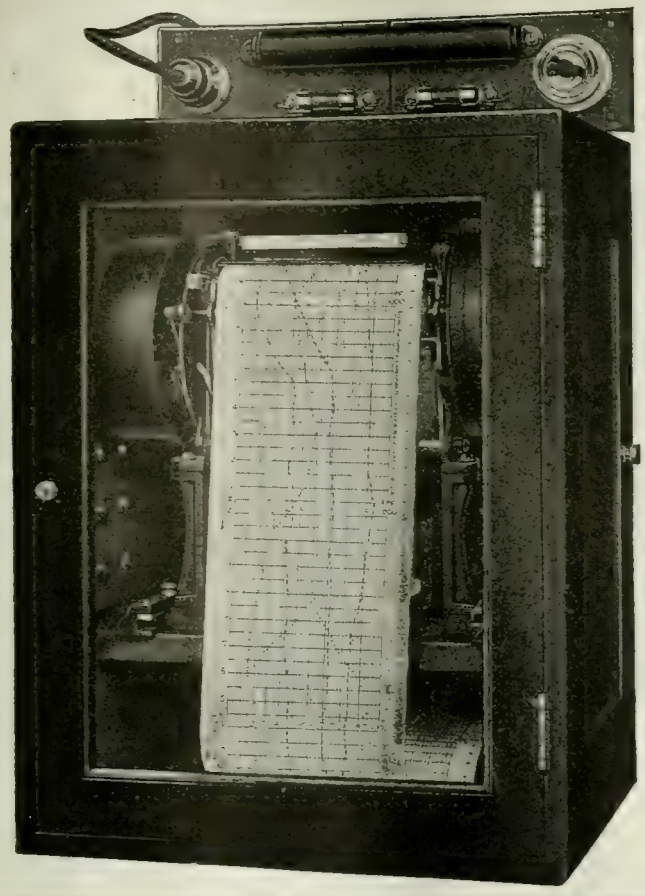
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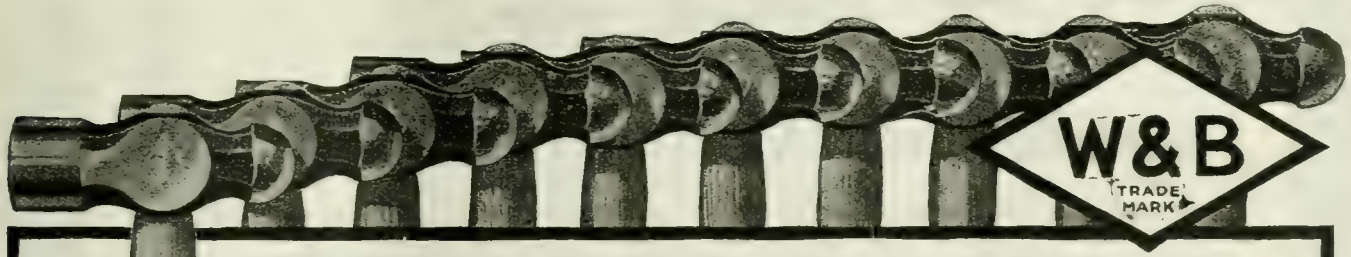
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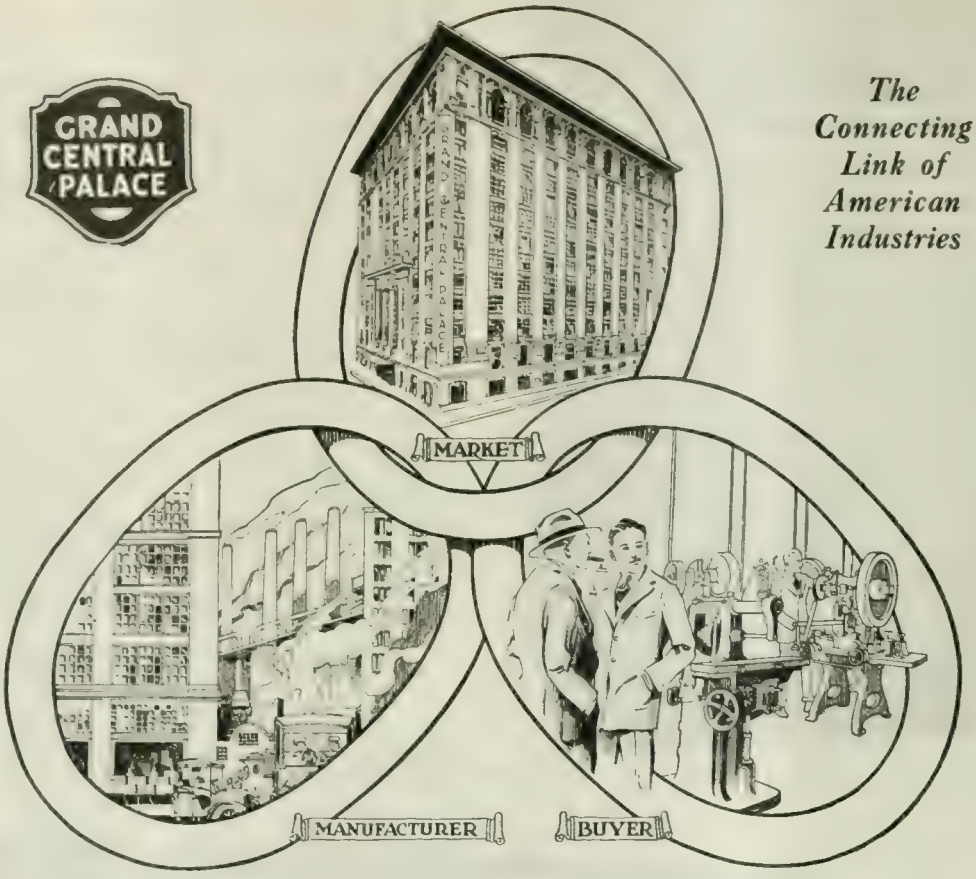
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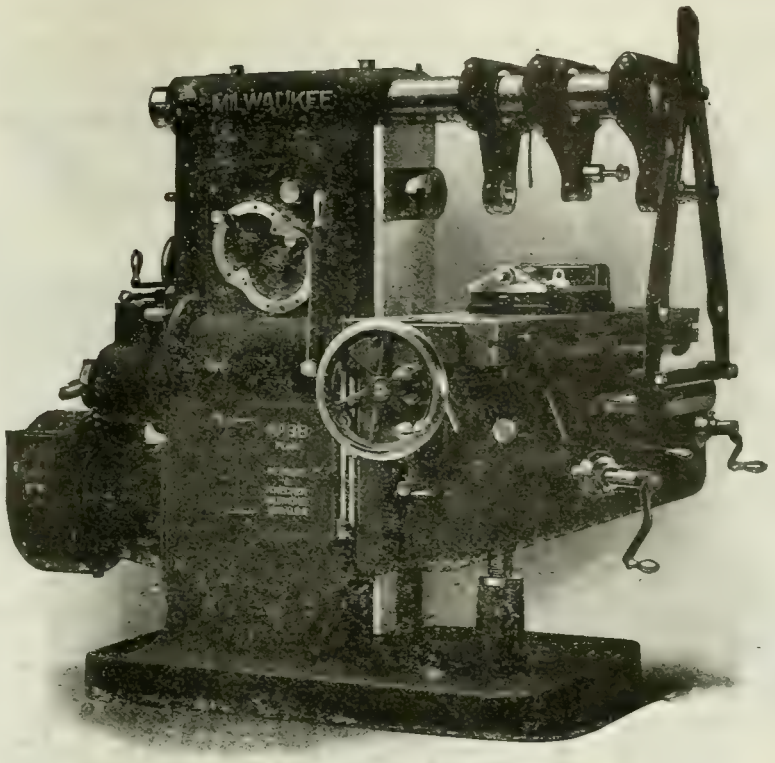
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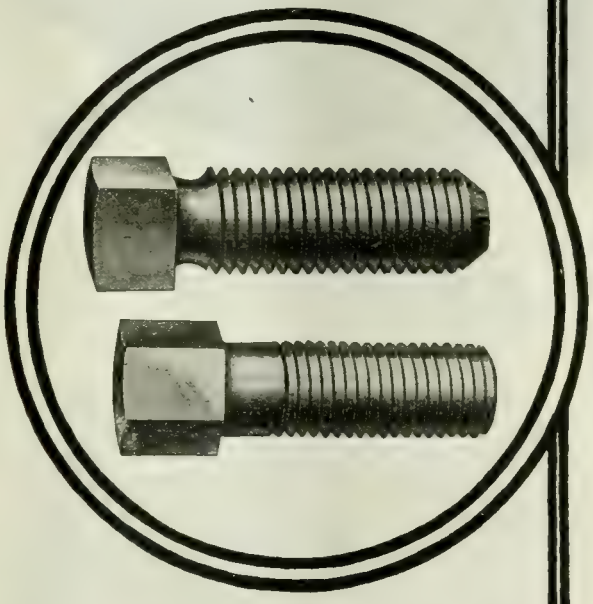
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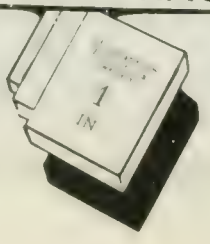
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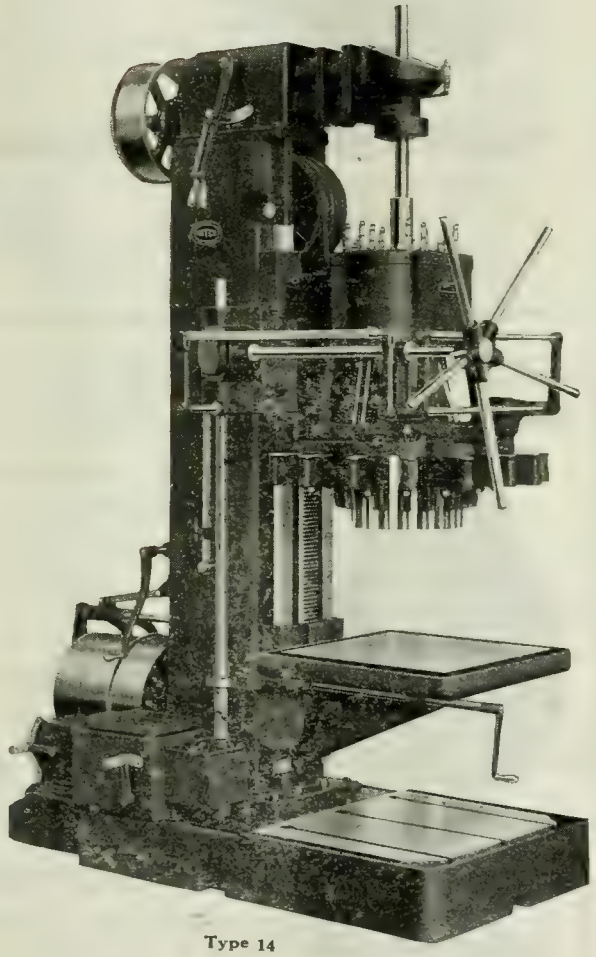
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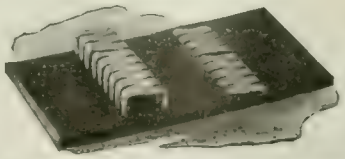
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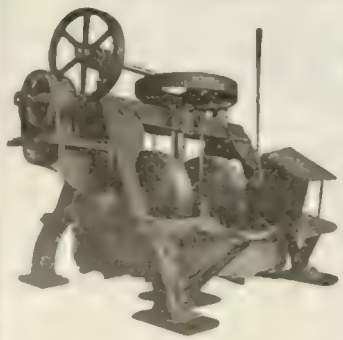
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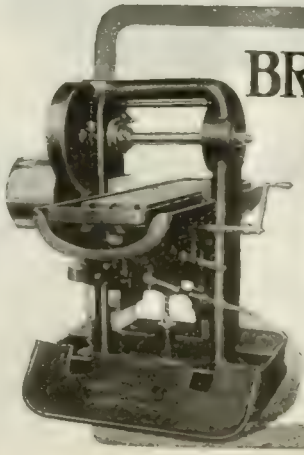
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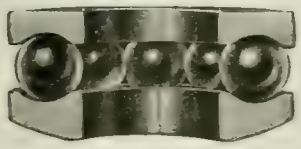
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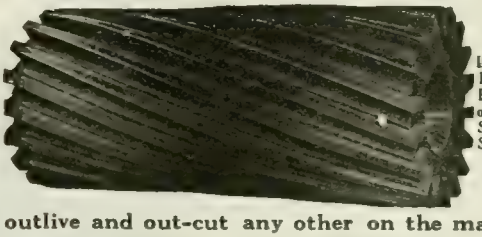
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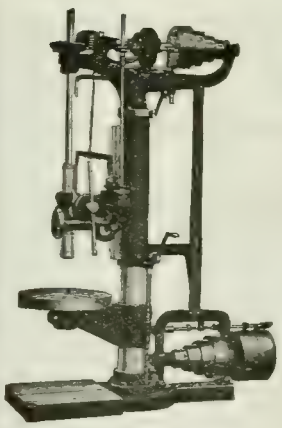
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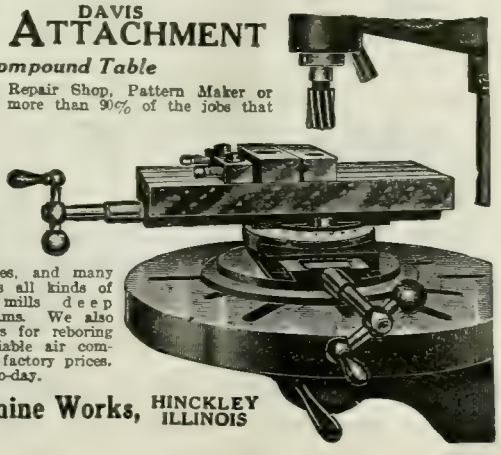
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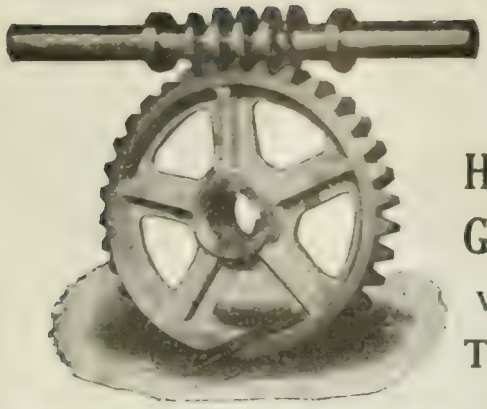


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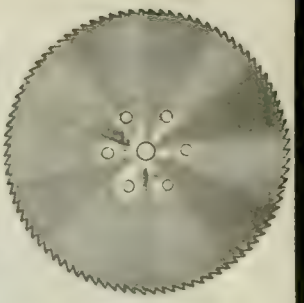
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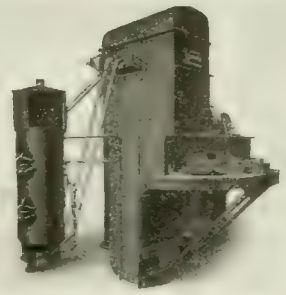
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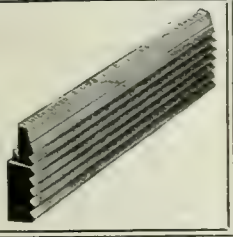
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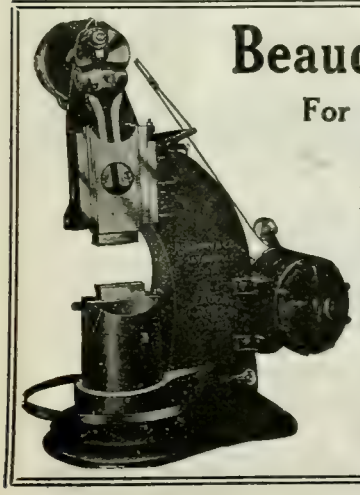
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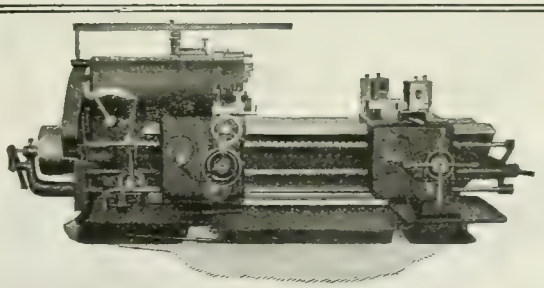
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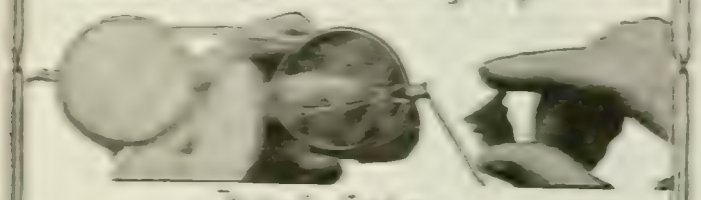
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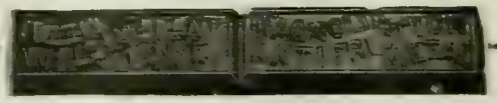
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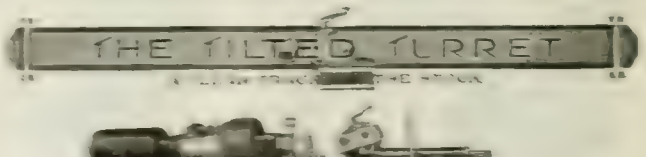


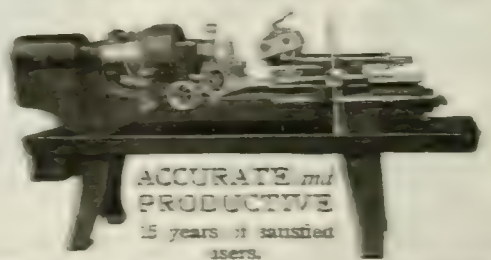
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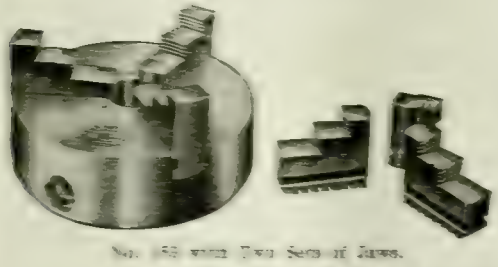
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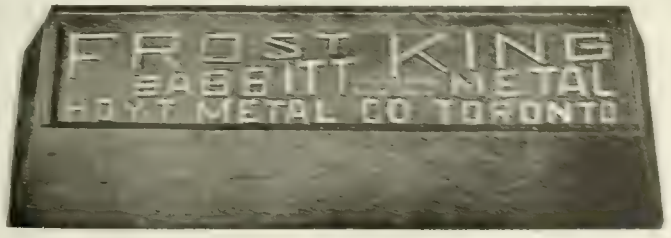
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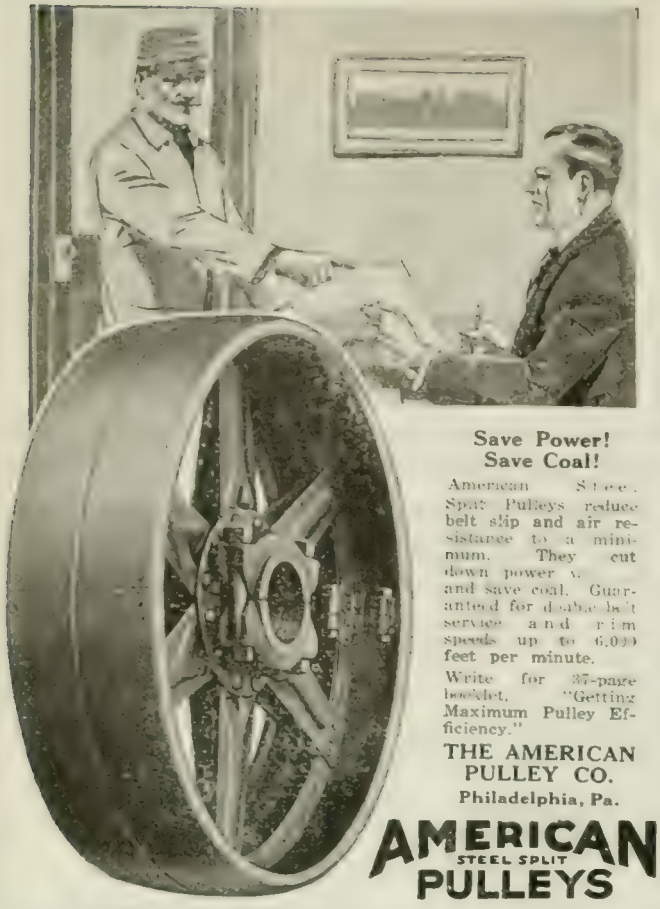
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Note On Grinding

NORTON COMPANY WORCESTER MASS

No. 68A

A FEW FACTS FOR THE FORGE SHOP

Because grinding wheels and machinery are used only occasionally and on a small scale in the average forge shop is no reason why fundamentals for correct usage should be completely ignored.

We advocate that some attention be paid the following details, not for any selfish reasons, but because it means dollars and cents in saving to the user:

1.—MACHINE CONDITIONS.

Whether the machines be of the bench or floor type they should be of heavy construction and anchored rigidly to the bench floor. This is to prevent vibration—a source of wheel waste.

Keep the bearings properly taken up so that no undue vibration comes from loose boxes.

Remember, vibration means waste of abrasive.

2.—WHEEL SPEED

The correct speed for wheels used in the forge shop is between 5000 and 6000 surface feet per minute. If possible, the R.P.M. of the grinding machine spindle should be increased as the wheel wears down, so that this speed is maintained as nearly as possible.

Slow speed make wheels act softer and hence wear faster.

Slow speeds cause wheels to get out of truth quickly—hence, out of balance. Often the wheel is accused of having hard and soft spots, when in reality it is not kept in truth.

Keep the rests adjusted close to the wheel face.

3. CORRECT GRAIN AND GRADE.

Good wheels for the forge shop at 36-O or 30-P ALUNDUM for off-hand grinding of chisels and tools. For grinding forgings 24-Q ALUNDUM will usually give satisfactory results. For the flashes left in drop forging or for sharper contact, use 24-R ALUNDUM.

These are but general recommendations and it is usually better to specify for each particular class of work and set of conditions after they are known.

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BRONZE COPPER
Canada Metal Co., Toronto.

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Foss Mchy. & S'ply Co., Geo F. Montreal
Garlock Walker Machinery Co., Toronto.
Williams & Wilson, Limited, Montreal.

BUCKETS, DUMP
MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

BUCKETS, ELEVATOR
Can. Link-Belt Co., Toronto, Ont.
MacKinnon Steel Co., Sherbrooke, Que.

BUCKETS, CLAM SHELL, CRAB, DUMP
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Northern Crane Works, Ltd, Walkerville.

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Bertram & Sons Co., John, Dundas.
Canada Machinery Corp., Galt, Ont.
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Williams & Wilson, Limited, Montreal.

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Northern Crane Works, Ltd., Walkerville.

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Morrow Screw & Nut Co., John, Ingersoll.

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CABINETS, SAND BLAST
Pangborn Corporation, Hagerstown, Md.

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International Machinery & Supply Co., Ltd., Montreal, Que.

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Brown Boggs & Co., Hamilton, Can.

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Wilson & Co., J. C., Belleville, Ont.

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Union Carbide Co., Toronto, Ont.

CARBONIZING BOXES
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Katie Foundry, Galt, Ont.
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.
Swedish Crucible Steel Co., Windsor.

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Jones & Glassco, Montreal.

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Can. Blower & Forge Co., Kitchener, Ont
Can. Fairbanks-Morse Co., Ltd, Montreal
Elec. Steel & Metals, Welland, Ont.
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.

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Brockville Foundry Co., Brockville, Ont.
Franklin Mfg. Co., Syracuse, N.Y.
Canada Metal Co., Ltd., Toronto, Ont.

CASTINGS, DIE CAST
Canada Metal Co., Ltd., Toronto, Ont.
Franklin Mfg. Co., Syracuse, N.Y.

CASTINGS, STEEL—ALL KINDS
Electric Steel & Metals Co., Welland
Fellows Bros., Ltd., Chadley Heath, Eng.

CARRIERS COUPLING BOLTS
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Alexander Fleck, Ltd., Ottawa.
Greenleafs Ltd., Belleville, Ont.
St. Lawrence Welding Co., Montreal.
Tallman Brass & Metal Co., Hamilton.

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Brown & Sharpe Mfg. Co., Providence, R.I.

CASTINGS, BRASS AND IRON
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International Machinery and Supply Co., Ltd., Montreal, Que.

CASTINGS, BUILDING
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CASTINGS, GRAY IRON
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Gardner & Son, Robt., Montreal.
Greenleafs, Ltd., Belleville, Ont.
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CASTINGS, STEEL CHROME AND MANGANESE STEEL
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Dom. Foundries & Steel, Hamilton, Ont.
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International Malleable Iron Co., Guelph

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Morrow Screw & Nut Co., J., Ingersoll, Ont
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Wells Bros. Co. of Canada, Galt, Ont.
Whitman & Barnes Mfg. Co., Akron, O.

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Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

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Garlock-Walker Machy. Co., Toronto.
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Rice Lewis & Son, Toronto, Ont.
Williams & Wilson, Ltd., Montreal, Que.
Jones & Glassco, Montreal, Que.

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CHAINS, FORGED
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Williams & Wilson Ltd., Montreal, Que.

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Garlock-Walker Mach'y Co., Toronto.
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Chicago, Ill.
Jacobs Mfg. Co., Hartford, Conn.
Modern Tool Co., Erie, Pa.
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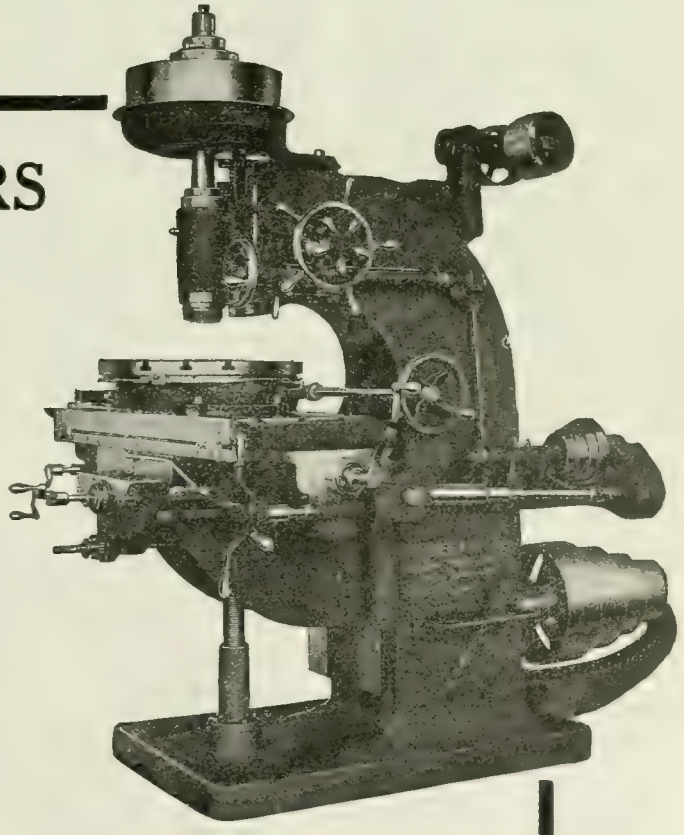
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Norton, Ralph B., Agent, Montreal.
Swedish Steel & Importing Co., Ltd., Montreal.

DRILLING MACHINES, GANG
Barnes, W. F. & John, Co., Rockford, Ill.
Bilton Mach. Tool Co., Bridgeport, Conn
Canada Machinery Corp., Galt, Ont.
Silver Mfg. Co., Salem, Ohio
Williams & Wilson, Ltd., Montreal, Que.

DRILLING MACHINES, LOCOMOTIVE AND MULTIPLE SPINDLE
John Bertram & Sons Co., Dundas
Bilton Mach. Tool Co., Bridgeport, Conn.
Can. Blower & Forge Co., Kitchener, Ont
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks Morse Co., Montreal.
Foss Mchy. & S'ply Co., G. F., Montreal.
Fox Machine Co., Jackson, Mich
Garlock-Walker Mach. Co., Toronto.
Garvin Machine Co., New York.
Hoefer Mfg., Co., Freeport, Ill.
Henry & Wright Mfg. Co., Hartford, Conn
A. B. Jardine & Co., Hespeler, Ont
Landis Tool Co., Waynesboro, Pa.
Nat. Automatic Tool Co., Richmond, Ind.
Niles-Bement-Pond Co., New York.
Rockford Drilling Mach Co., Rockford, Ill

DRILLING MACHINES, RADIAL AND TURRET
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Canadian Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Garlock Walker Machinery Co., Toronto.
Henry & Wright Mfg. Co., Hartford.
Landis Tool Co., Waynesboro, Pa.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal

DRILLING MACHINES, SENSITIVE
Bilton Mach. Tool Co., Bridgeport, Conn
W. F. & John Barnes Co., Rockford, Ill.
Canadian Fairbanks-Morse Co., Montreal.
Canadian Machinery Corp., Galt, Ont.
Geo. F. Foss Mch. & S'ply Co., Montreal
Garlock Walker Mach. Co., Toronto, Ont.
Henry & Wright Mfg. Co., Hartford, Conn
Landis Tool Co., Waynesboro, Pa.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
United States Mach. Tool Co., Cincinnati
Williams & Wilson, Limited, Montreal.

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Blomquist-Eck Mach. Co., Cleveland, O.
John Bertram & Sons Co., Dundas.
Garlock-Walker Mach. Co., Toronto, Ont
Can. Blower & Forge Co., Kitchener.
Canada Mach. Corp., Galt, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Fry's (London), Ltd., London, Eng.
Garlock-Walker Mach. Co., Toronto, Ont.
Hoefer Mfg. Co., Freeport, Ill.
A. B. Jardine & Co., Hespeler, Ont.
Landis Tool Co., Waynesboro, Pa.
R. McDougall Co., Galt.
Nat. Automatic Tool Co., Richmond, Ind.
Rockford Drilling Mach. Co., Rockford, Ill
Niles-Bement-Pond Co., New York.
Silver Mfg. Co., Salem, Ohio.
A. R. Williams Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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Wickes Bros, Saginaw, Mich.

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Keystone Mfg. Co., Buffalo, N.Y.
Rice Lewis & Son, Toronto, Ont.
Silver Mfg. Co., Salem, Ohio.

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W. F. & John Barnes Co., Rockford, Ill
Can. Blower & Forge Co., Kitchener.
Can. Fairbanks-Morse Co., Montreal.
Geo. F. Foss Mch. & S'ply Co., Montreal
Fry's (London), Ltd., London, England
Garlock-Walker Machinery Co., Toronto.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
U.S. Electrical Tool Co., Cincinnati, O.
Williams & Wilson, Ltd., Montreal, Que.

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Cleveland Twist Drill Co., Cleveland.
Morrow Screw & Nut Co., John, Ingersoll
Morse Twist Drill & Machine Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., Akron, O.
Wilt Twist Drill Co., of Can., Walkerville
Williams & Wilson, Ltd., Montreal, Que.

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Can. Blower & Forge Co., Kitchener.
Cleveland Twist Drill Co., Cleveland.
Geo. F. Foss Mch. & S'ply Co., Montreal
A. B. Jardine & Co., Hespeler, Ont.
Morrow Screw & Nut Co., John, Ingersoll
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., Akron, O.
Wilkinson & Kompass, Hamilton, Ont.
Wilt Twist Drill Co. of Can., Walkerville

DRILLS, CARBON
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Marshall, Son & Bunney, Toronto.
John Morrow Screw & Nut Co., Ingersoll

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Niles-Bement-Pond Co., New York.
Pilot Steel & Tool Co., Montreal, Que.
Prest-O-Lite Co., Inc., Toronto, Ont.
U. S. Electrical Tool Co., Cincinnati, O.
A. R. Williams Mach. Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Ltd., Montreal, Que.

DRILLS, EMERY
Garlock-Walker Mach. Co., Toronto, Ont.

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Armstrong-Whitworth of Can., Montreal.
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Butterfield & Co., Rock Island, Que.
Cleveland Twist Drill Co., Cleveland.
Canadian Fairbanks-Morse Co., Montreal
H. A. Drury Co., Montreal
Geo. F. Foss Mch. & S'ply Co., Montreal
McKenna Brothers, Pittsburgh, Pa.
Marshall, Son & Bunney, Toronto.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Machine Co., New Bedford, Mass.
W. F. & John Barnes Co., Rockford, Ill
Plewes, Ltd., Winnipeg, Man.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Montreal.
Taylor, J. A. M., Star Bldg., Toronto.
Whitman & Barnes Mfg. Co., Akron, O.
Wilt Twist Drill Co. of Can., Walkerville
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Ltd., Montreal, Que

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Morse Twist Drill & Mach. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.

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Cleveland Pneumatic Tool Co., Toronto.
Independent Pneumatic Tool Co., Chicago.
Niles-Bement-Pond Co., New York
Williams & Wilson, Limited, Montreal.

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Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto.
Independent Pneumatic Tool Co., Chicago.

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Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Wiseman & Barnes Mfg. Co., Akron, O.
Wilt Twist Drill Co. of Can., Walkerville.

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Cleveland Twist Drill Co., Cleveland.
The Foss Mchy. & Supply Co., Montreal.
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National Machy. Co., Tiffin, Ohio.
Williams & Wilson, Ltd., Montreal, Que.

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Standard Fuel Engr. Co., Detroit, Mich.
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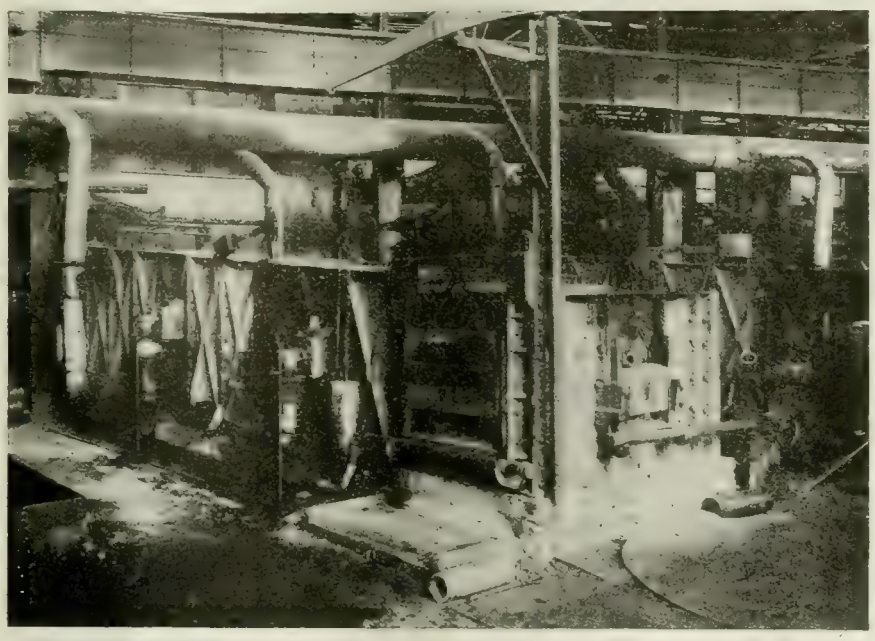
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Garlock-Walker Machinery Co., Toronto.
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Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Ltd., Montreal.

GRINDERS, DIE AND CHASER

Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
National Acme Co., Cleveland, Ohio.

GRINDERS, DISK

Armstrong Bros. Tool Co., Chicago, Ill.
Ford-Smith Mach. Co., Hamilton.
Gardner Machine Co., Beloit, Wis.
Heald Machine Co., Worcester, Mass.

GRINDERS, DRILL

Aikenhead Hardware Co., Toronto.
Foss Mchy. & S'ply Co., G. F., Montreal.
Garvin Machine Co., New York.
Greenfield Tap & Die, Greenfield.
United States Elec. Tool Co., Cincinnati.
Wells Bros. of Canada, Galt, Ont.
Williams & Wilson, Ltd., Montreal.

GRINDERS, CYLINDER, INTERNAL

Brown & Sharpe Mfg. Co., Providence, R.I.
Foss Mchy. & S'ply Co., G. F., Montreal.
Greenfield Machine Co., Greenfield, Mass.
Heald Machine Co., Worcester, Mass.
Landis Tool Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Norton Grinding Co., Worcester, Mass.
Williams & Wilson, Ltd., Montreal.

GRINDERS, PORTABLE, ELECTRIC, HAND, TOOL POST, FLOOR AND BENCH

Baird Machine Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R.I.
Cincinnati Electrical Tool Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Wisconsin Electric Co., Inc., Racine, Wis.
Foss Mchy. & S'ply Co., G. F., Montreal.
Grant Mfg. & Mach. Co., Bridgeport, Conn.
Garlock-Walker Machinery Co., Toronto.
Greenfield Machine Co., Greenfield, Mass.
Independent Pneumatic Tool Co., Chicago.
United States Elec. Tool Co., Cincinnati.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal.
Wilkinson & Kompass, Hamilton, Ont.

GRINDERS, HOLE, HOLE AND FACE AND DEEP HOLE

Bryant Chucking Grinder Co., Springfield, Vermont.

GRINDERS, PNEUMATIC

Can. Ingersoll-Rand Co., Montreal.
Cleveland Pneumatic Tool Co., Toronto
Garlock-Walker Machinery Co., Toronto.
Independent Pneumatic Tool Co., Chicago.
MacGovern & Co., Montreal, Que.

GRINDERS, ROTARY SURFACE

Brown & Sharpe Mfg. Co., Providence, R.I.
Bristol Machine Tool Co., Bristol, Conn.

GRINDERS, TOOL AND HOLDER

Armstrong Bros. Tool Co., Chicago.
W. F. & John Barnes Co., Rockford, Ill.
Blount, & Co., J. G., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R.I.
Ford-Smith Machine Co., Hamilton, Ont.
Greenfield Machine Co., Greenfield, Mass.
Greenfield Tap & Die Corp., Greenfield.
National-Acme Co., Cleveland, Ohio
Tabor Mfg. Co., Philadelphia, Pa.
Wells Bros. of Canada, Galt, Ont.

GRINDERS, UNIVERSAL, PLAIN

Modern Tool Co., Erie, Pa.
Norton Grinding Co., Worcester, Mass.
Williams & Wilson, Ltd., Montreal.

GRINDERS, VERTICAL, SURFACE

Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal
Heald Machine Co., Worcester, Mass.
Pratt & Whitney Co., Dundas, Ont.
Gisholt Machine Co., Madison, Wis.
Norton Grinding Co., Worcester, Mass.
Williams & Wilson, Ltd., Montreal.

GRINDING AND POLISHING MACHINES, PORTABLE, PNEUMATIC AND SPRING FRAME

Can. Fairbanks-Morse Co., Montreal
Cincinnati Elec. Tool Co., Cincinnati, O.
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner & Son, Robt., Montreal.
Garvin Machine Co., New York
Garlock-Walker Machinery Co., Toronto.
Greenfield Machine Co., Greenfield, Mass.
Hall & Sons, John H., Brantford, Ont.
LeBlond Mch. Tool Co., R. K., Cincinnati
Niles-Bement-Pond Co., New York, N.Y.
Norton Grinding Co., Worcester, Mass.
Wisconsin Electric Co., Racine, Wis.
Williams & Wilson, Ltd., Montreal.

GRINDING MACHINES, CAR WHEEL, CUTTER CYLINDRICAL, CRANKSHAFT

Brown & Sharpe Mfg. Co., Providence, R.I.
Norton Grinding Co., Worcester, Mass.

GRINDING WHEELS

Aikenhead Hardware Co., Toronto, Ont.
Brantford Emery Wheel Co., Brantford.
Can. Fairbanks-Morse Co., Montreal.
Ford-Smith Machine Co., Hamilton, Ont.
Foss Mchy. & S'ply Co., G. F., Montreal.
Norton Co., Worcester, Mass.

GRIT, ANGULAR

Pittsburgh Crushed Steel Co., Pittsburgh.

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Canada Machinery Corp., Galt, Ont.
Canada Wire & Iron Goods, Co., Hamilton
Dennis Wire & Iron Works, London, Ont.
Page Steel & Wire Co., Adrian, Mich.
Strong, Kennard & Nutt Co., Cleveland.

HANDLES, BALANCE, CRANK AND MACHINE

Williams & Co., J. H., Brooklyn, N.Y.

HACK SAW BLADES

Aikenhead Hardware Co., Toronto, Ont.
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Boker & Co., Inc., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Diamond Saw & Stamping Wks., Buffalo.
Ford-Smith Machine Co., Hamilton, Ont.
Kayser Ellison & Co., Ltd., Montreal.
Marshall, Son & Bunney, Toronto.
Norton, Ralph B., Agent, Montreal.
Foss Mchy. & S'ply Co., G. F., Montreal
Fry's (London), Ltd., London, England.
Racine Tool & Machine Co., Racine, Wis.
Plewes, Ltd., Winnipeg, Man.
Pilot Steel & Tool Co., Montreal, Que.
Rice Lewis & Son, Toronto, Ont.
Simonds Mfg. Co., Fitchburg, Mass.
L. S. Starrett Co., Athol, Mass.
Standard Machy. & Supplies, Montreal.
Victor Saw Works, Ltd., Hamilton.
Wilkinson & Kompass, Hamilton
Williams & Wilson, Ltd., Montreal.

HACK SAW FRAMES

Aikenhead Hardware Co., Toronto.
Can. Fairbanks-Morse Co., Montreal.
Ford-Smith Machine Co., Hamilton, Ont.
Garvin Machine Co., New York City.
Victor Saw Works, Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Ltd., Montreal.

HACK SAWS, POWER

Aikenhead Hardware Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Diamond Saw & Stamping Wks., Buffalo.
Foss Mchy. & S'ply Co., G. F., Montreal.
Ford-Smith Machine Co., Hamilton.
Peerless Machine Co., Racine, Wis.
Racine Tool & Mach. Co., Racine, Wis.
Starrett Co., L. S., Athol, Mass.
Victor Saw Works, Hamilton, Ont.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal.

HAMMERS (DROP), MOTOR AND BELT DRIVEN

Beaudry & Co., Boston, Mass.
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton.
Can. Billings & Spencer, Ltd., Welland.
Canada Machinery Corp., Galt, Ont.
High Speed Hammer Co., Rochester, N.Y.
Jardine & Co., A. B., Hespeler, Ont.
Niles-Bement-Pond Co., New York, N.Y.
Toledo Machine & Tool Co., Toledo.
United Hammer Co., Boston, Mass.
Williams & Wilson, Ltd., Montreal.

HAMMERS, HELVE POWER

Canada Machinery Corp., Galt, Ont.
West Tire Setter Co., Rochester, N.Y.
Williams & Wilson, Limited, Montreal.

HAMMERS, CHIPPING, CAULKING, PNEUMATIC

Can. Ingersoll-Rand Co., Montreal, Que.
Garlock-Walker Machinery Co., Toronto.
Independent Pneumatic Tool Co., Chicago.

HAMMERS, MARKING

Matthews & Co., Jas. H., Pittsburgh, Pa.

HAMMERS, NAIL MACHINE

Rice Lewis & Son, Toronto, Ont.
United Hammer Co., Boston, Mass.

HAMMERS, STEAM

Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.

HAND PLANERS

Oliver Mchry. Co., Grand Rapids, Mich.

HAND LEATHERS OR PADS

Graton & Knight Mfg. Co., Montreal.

HANGERS

Brown & Sharpe Mfg. Co., Providence, R.I.

HANGERS, SHAFT

Algoma Steel Corp., Sault Ste. Marie
Can. General Electric Co., Toronto, Ont.
Chapman Double Ball Bearing Co., Toronto
Gray Ball Bearing Co., Ltd., Toronto
Baird Machine Co., Bridgeport, Conn.
Can. S K F Co., Toronto, Ont.
Gardner & Son, Robt., Montreal.
Jones & Glassco, Montreal
Standard Pressed Steel Co., Philadelphia
Williams & Wilson, Limited, Montreal

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Shore Instrument & Mfg. Co., New York

HEAD, AUXILIARY

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HEAT TREATMENT OF STEEL

Gray Ball Bearing Co., Ltd., Toronto.

HEAT GAUGES, HARDENING AND ANNEALING

Shore Instrument & Mfg. Co., New York.

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Strong, Kennard & Nutt Co., Cleveland.

HIGH SPEED STEEL

See Steel.

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Illinois Tool Works, Chicago, Ill.

HINGES

London Bolt & Hinge Wks., London, Ont.

HOBS

Greenfield Tap & Die Co., Greenfield, Mass
Illinois Tool Works, Chicago, Ill.
Pratt & Whitney Co., Dundas, Ont.
Taylor, J. A. M., 318 Stair Bldg., Toronto.
Wells Bros. of Canada, Galt, Ont.

HOISTS, AIR

Can. Ingersoll-Rand Co., Ltd., Sherbrooke
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

HOISTS, CHAIN AND PNEUMATIC

Can. Ingersoll-Rand Co., Montreal, Que.
Garlock-Walker Machinery Co., Toronto.
Ford Chain Block & Mfg., Philadelphia.
Independent Pneumatic Tool Co., Chicago.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Wright Mfg. Co., Lisbon, Ohio.
Williams & Wilson, Limited, Montreal.

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Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Que.
Electric Steels & Metals Ltd., Welland.
Kennedy & Sons, Owen Sound, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Williams & Wilson, Limited, Montreal.

HOLDERS, STEEL DIE FOR MARKING

Matthews & Co., Jas. H., Pittsburgh, Pa.

HOLDERS, ELECTRIC

Electric Steels & Metals, Ltd., Welland.

HOOKS, BELT LACING

Clipper Belt Lacer Co., Grand Rapids.

HOPPERS

MacKinnon Steel Co., Ltd., Sherbrooke.
Dominion Bridge Co., Montreal, Que.
William Hamilton Co., Peterboro, Ont.
Toronto Iron Works, Ltd., Toronto, Ont.

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Garlock-Walker Machinery Co., Toronto
Independent Pneumatic Tool Co., Chicago
Wells Bros. Co. of Canada, Galt, Ont.

HOSE, ALL KINDS

Int Mach. & Supply Co., Ltd., Montreal.

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Pangborn Corporation, Hagerstown, Md.

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Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
Perrin, Ltd., William R., Toronto.
West Tire Setter Co., Rochester, N.Y.
Victoria Foundry Co., Ottawa.
Williams & Wilson, Limited, Montreal.

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Taylor Instrument Co., Rochester, N.Y.

INDICATORS, SPEED

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Brown & Sharpe Mfg. Co., Providence
Starrett Co., L. S., Athol, Mass.

INDEX CENTRES

Brown & Sharpe Mfg. Co., Providence, R.I.
Dickow, Fred C., Chicago, Ill.
Ford-Smith Machine Co., Hamilton, Ont.
Garvin Machine Co., New York.
Williams & Wilson, Limited, Montreal.

INDICATING INSTRUMENTS

Taylor Instrument Co., Rochester, N.Y.

INGOT METAL

Brown's Copper & Brass Rolling Mills New Toronto, Ont.

INGOTS, STEEL

Nova Scotia Stl. & Coal Co., New Glasgow

INGOTS, FORGING AND ROLLING

Electric Steel & Metals Co., Welland.

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Consolidated Optical Co., Toronto.

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IRON SAND

Pittsburgh Crushed Steel Co., Pittsburgh.

IRON, WROUGHT, ROLLED, PIG

Swedish Steel & Impt. Co., Ltd., Montreal

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Northern Crane Works, Walkerville.
Norton, A. O., Coaticook, Que.
Rice Lewis & Son, Toronto, Ont
Williams & Wilson, Limited, Montreal.

JACKS, SCREW AND HYDRAULIC

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JACKS, PIT AND TRACK

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Northern Crane Works, Walkerville.

JAWS, FACE PLATE

Cushman Chuck Co., Hartford, Conn.
Skinner Chuck Co., New Britain, Conn.

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Gray Ball Bearing Co., Ltd., Toronto.

JIGS, TOOLS, ETC.

Brown Engineering Corp., Toronto.
Elliott & Whitehall Mach. & Tool Co., Galt.
Gisholt Machine Co., Madison, Wis.
Homer & Wilson, Hamilton, Ont.
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ont.
Toronto Tool Co., Toronto, Ont.

JOURNAL WEDGES

Canada Foundries & Forgings, Welland.

KEY SEATERS

Garlock-Walker Machy. Co., Toronto, Ont.
Garvin Machine Co., New York.
Morton Mfg. Co., Muskegon Heights, M.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal.

KEYS, MACHINE

Whitney Mfg. Co., Hartford, Conn.
Williams & Co., J. H., Brooklyn, N.Y.

KILNS

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Kennedy & Sons, Wm., Owen Sound, Ont.
MacKinnon Steel Co., Sherbrooke, Que.

KNIFE GRINDERS

Gray Ball Bearing Co., Ltd., Toronto.

LABELS AND TAGS

Matthews & Co., Jas. H., Pittsburgh, Pa.

LABORATORIES, INSPECTION AND TESTING (See Chemists)

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Northern Crane Works, Walkerville.

LACING MACHINES

Clipper Belt Lacer Co., Grand Rapids, M.

LAMPS, ARC, INCANDESCENT

Can. General Electric Co., Toronto, Ont.

LAMPS, TUNGSTEN AND NITRO

Can. General Electric Co., Toronto, Ont.

LAG SCREW GIMLET POINTERS

National Machy. Co., Tiffin, Ohio.

LATHES, CHUCKING

Acme Machine Tool Co., Cincinnati, Ohio
Wood Turret Machine Co., Brazil, Ind.
Williams & Wilson, Limited, Montreal.

LATHE CHUCKS (See Chucks)

LATHE DOGS AND ATTACHMENTS

Armstrong Bros. Tool Co., Chicago.
Curtis & Curtis Co., Bridgeport, Conn.
Hendey Machine Co., Torrington, Conn.
Williams & Co., J. H., Brooklyn, N.Y.

LATHES, AUTOMATIC AND SEMI-AUTOMATIC

Gisholt Machine Co., Madison, Wis.
Wood Turret Machine Co., Brazil, Ind.

LATHES, AXLE

Bridgeford Mach. Tool Works, Rochester.

LATHES, BORING

Bridgeford Mach. Tool Works, Rochester.
Lodge & Shipley, Cincinnati, O.
Williams & Wilson, Ltd., Montreal, Que.

LATHES, PRECISION, BENCH

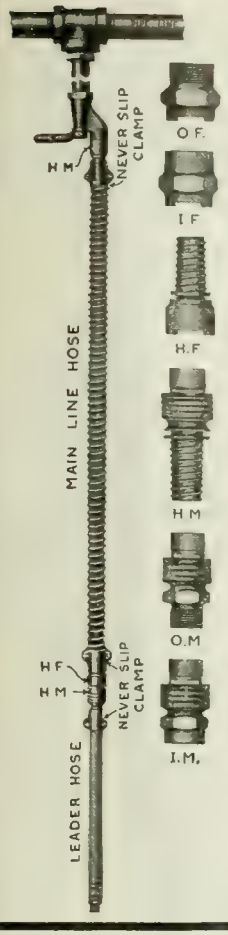
W. F. & John Barnes Co., Rockford.
J. G. Blount & Co., Everett, Mass.
Canadian Fairbanks-Morse Co., Montreal.
Geo. F. Foss Machy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto.
Hardinge Bros., Chicago, Ill.
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Seneca Falls Mfg. Co., Seneca Falls, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

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Hardinge Bros., Chicago, Ill.
Lodge & Shipley, Cincinnati, O.
Wood Turret Machine Co., Brazil, Ind.
Williams & Wilson, Ltd., Montreal, Que.

LATHES, ENGINE

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John Bertram & Sons Co., Dundas.
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Canadian Fairbanks-Morse Co., Montreal.
Cisco Machine Tool Co., Cincinnati, Ohio.
Wickes Bros., Saginaw, Mich.
G. F. Foss Mchy. & S'ply Co., Montreal.
Garlock-Walker Machinery Co., Toronto.
Garvin Machine Co., New York.
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CLEVELAND HOSE SPECIALTIES

Bowes Automatic Air Hose Couplings

Standard Equipment Everywhere

STYLE O.F. is an Outside Thread Female Pipe End. Made in sizes ⅜-inch to 1½-inch.
STYLE I.F. is an inside Thread Female Pipe End. Made in sizes ¼-inch to 1½-inch.
STYLE H.F. is a Female Hose End with spiral shank to insert into the hose and has groove for the Never Slip Hose Clamp. Made in sizes ¼-in. to 1½-in.
STYLE H.M. is a Male Hose End with spiral shank to insert into the hose and has groove for the Never Slip Hose Clamp. Made in sizes ¼-in. to 1½-in.
STYLE O.M. is an Inside Thread Male Pipe End Made in sizes ⅜-in. to 1½-in.
STYLE I.M. is an Inside Thread Male Pipe End. Made in sizes ¼-in. to 1½-in.
The Male and Female Ends of Bowes Couplings interchange in sizes ¼-in. to ¾-in. Sizes 1-in. and 1¼-in. interchange. The 1½-in. ends interchange only with themselves.

BOWES COUPLINGS

Are instantly connected or disconnected.
They are absolutely air-tight under all pressures.
They quickly pay for themselves by stopping costly leaks.
They interchange in sizes most commonly used.
They have no loose parts to be mislaid or lost.
They are made of brass and will not rust.
The U-shaped Gasket interchanges in couplings ¼-inch to ¾-in.

The Cleco Never Slip Hose Clamp

Made in same sizes as Bowes Couplings

The adjoining cut of Cleco Never Slip Hose Clamp shows the "Flanges" which engage the groove provided in all hose ends of Bowes Couplings. The "Model Hose Line" illustrated shows correct styles of couplings and valve to use and proper way to attach the clamps.



CLECO GROOVED HOSE NIPPLE



Grooved Nipples when attached to hose with the wire clamp cannot "blow-out," as one-half of the Wire Clamp lies in Nipple Groove, and the other half on the hose, uniting nipple and hose permanently.

WIRE CLAMP TOOL

To apply Wire Clamps to Grooved Hose Nipples you need the Wire Clamp Tool illustrated, a small hand-operated tool at moderate cost which we carry in stock for immediate delivery. In Stock: Riveting and Chipping Hammers, Four-piston Air Drills, Corner Drills, Emery Grinders, Sand Rammers, Holder Ons, etc.



Use Annealed Wire No. 14

Write for Bulletin 38 illustrating Cleco Hose Fittings, Couplings, Valves, etc.

IMPORTANT:—The Small Leaks in your "AIR LINE" mean serious loss in DOLLARS. Have you any idea of the amount of "Air" wasted in small leaks at your connections? Air Leakage through 1-16 in. opening equals 5.32 cu. ft. per minute at 80 lbs. It will pay you to install Bowes Couplings and stop costly leaks.

Write for Bulletin 34A, 41 and 43.

CLEVELAND PNEUMATIC TOOL CO. OF CANADA LTD., 84 Chestnut St., TORONTO

A. R. WILLIAMS MACHINERY CO., TORONTO, 337 Craig St., W., MONTREAL. WILLIAMS & WILSON, MONTREAL

Let them know it's there

In complimenting us upon the results secured from their advertisement in the classified section, one advertiser said:

> "Of course we would not have sold it without letting people know it was here, that is obvious, and thanks are due you for letting the people know it was for sale."

If you have any old or used equipment for sale, let people know it's there. Your message in Canadian Machinery will be placed before the probable buyers of such equipment.

Canadian Machinery

Classified Advertising Section

143 University Ave., TORONTO

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ACCURACY ASSURED

You can always depend upon Dunbar Springs being **accurate.** Before proceeding with any order the first few springs are carefully tested and checked up for this very purpose.

Seventy-two years' experience making flat and spiral springs of every description enables us to furnish you with springs of the highest quality, that can be depended upon under all conditions.

Send blue prints for estimates.

The Dunbar Brothers Co.

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Whitcomb Blaisdell Mach. Tool Co., Worcester, Mass.
A. R. Williams Machy. Co., Toronto
Williams & Wilson, Ltd., Montreal, Que.
Worcester Lathe Co., Worcester, Mass.

LATHES, FOOT POWER
Seneca Falls Mfg. Co., Seneca Falls, N.Y.

LATHES, HORIZONTAL
Wood Turret Machine Co., Brazil, Ind.

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Wood Turret Machine Co., Brazil, Ind.
G. F. Foss Mchy. & S'ply Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Williams & Wilson, Ltd., Montreal, Que.

LATHES, POLISHING
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Wells Bros. of Canada, Galt, Ont.
Williams & Wilson, Ltd., Montreal, Que.

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Foster Machine Co., Elkhart, Ind.
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Heyburn Ltd., John T., Toronto, Ont.
Niles-Bement-Pond Co., New York
Seneca Falls Mfg. Co., Seneca Falls, N.Y.
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Williams Machy. Co., A. R., Toronto.
Wood Turret Machine Co., Brazil, Ind.
Worcester Lathe Co., Worcester, Mass.
Williams & Wilson, Ltd., Montreal, Que.

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Williams & Wilson, Ltd., Montreal, Que.

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Seneca Falls Mfg. Co., Seneca Falls, N.Y.
Worcester Lathe Co., Worcester, Mass.
Williams & Wilson, Ltd., Montreal, Que.

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LEATHER STRAPPING
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Standard Optical Co., Geneva, N.Y.

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Foss Mchy. & S'ply Co., G. F., Montreal
Standard Machy. & Supplies, Montreal.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MACHINERY GUARDS (See Guards)

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Cleveland Twist Drill Co., Cleveland
Jardine & Co., A. B., Hespeler, Ont.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

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Matthews & Co., Jas. H., Pittsburgh, Pa.

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Foss Mchy. & S'ply Co., G. F., Montreal
Perrin, Wm. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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Bowser & Co., S. F., Inc., Fort Wayne.

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METALLURGISTS
See Chemists.

METAL SAWS
See Saws.

METAL SAWS, POWER
Hoefer Mfg. Co., Freeport, Ill.

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Canada Metal Co., Toronto, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Montreal.

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MILLS, SAND
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Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Canada, Galt, Ont.

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Kearney & Trecker Co., Milwaukee, Wis.

MILLING ATTACHMENTS
Becker Milling Machine Co., Boston, Mass.
Bertram & Sons Co., John, Dundas, Ont.
Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati
Ford-Smith Mach. Co., Hamilton, Ont.
Fox Machine Co., Jackson, Mich.
Foss Mchy. & S'ply Co., G. F., Montreal
Hardinge Bros., Inc., Chicago, Ill.
Hendey Mach. Co., Torrington, Conn.
Hinckley Machine Works, Hinckley, Wis.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Taft-Peirce Mfg. Co., Woonsocket, R.I.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, AUTOMATIC
Bilton Mach. Tool Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R.I.
Betts Machine Co., Rochester, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

MILLING CUTTERS
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Cleveland Milling Machine Co., Cleveland.
Kearney & Trecker Co., Milwaukee, Wis.
Marshall, Son & Bunney, Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES HAND
Bristol Machine Tool Co., Bristol, Conn.

MILLING MACHINES, THREAD
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill.
Gray Ball Bearing Co., Ltd., Toronto.
United States Mach. Tool Co., Cincinnati.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, HORIZONTAL AND VERTICAL
Becker Milling Machine Co., Boston, Mass.
Bristol Machine Tool Co., Bristol, Conn.
Brown & Sharpe Mfg. Co., Providence
Bertram & Sons Co., John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machy. Co., Toronto, Ont.
Gooley & Edlund, Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Kearney & Trecker Co., Milwaukee, Wis.
LeBlond Mach. Tool Co., R. K., Cincinnati
Niles-Bement-Pond Co., New York
Pratt & Whitney Co., Dundas, Ont.
United States Mach. Tool Co., Cincinnati.
Whitney Mfg. Co., Hartford, Conn.
Williams Machy. Co., A. R., Toronto
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, PLAIN, BENCH AND UNIVERSAL
Becker Milling Machine Co., Boston, Mass.
Bilton Mach. Tool Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Mchy. & S'ply Co., G. F., Montreal
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machy. Co., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Machine Co., Torrington, Conn.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
LeBlond Mach. Tool Co., R. K., Cincinnati
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, PROFILE
Brown & Sharpe Mfg. Co., Providence.
Can. Fairbanks-Morse Co., Montreal.
Foss Mchy. & S'ply Co., G. F., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING TOOLS
Aikenhead Hardware Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence.
Ford-Smith Mach. Co., Hamilton, Ont.
Geometric Tool Co., New Haven, Conn.
Kempsmith Mfg. Co., Milwaukee, Wis.
Rice Lewis & Son, Toronto, Ont.
Tabor Mfg. Co., Philadelphia, Pa.
Williams & Wilson, Ltd., Montreal, Que.

MINE CARS
Can. Fairbanks-Morse Co., Montreal.
Dominion Bridge Co., Montreal, Que.
Elec. Steel & Metals, Welland, Ont.
MacKinnon Steel Co., Sherbrooke, Que.
Modern Tool Co., Erie, Pa.
Pratt & Whitney Co., Dundas, Ont.

MINING MACHINERY
Can. Fairbanks-Morse Co., Montreal.
Elec. Steel & Metals, Welland, Ont.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MIXERS, SAND
Frost Mfg. Co., Chicago, Ill.

MODEL WORK
Windsor Mach. & Tool Co., Windsor, Ont.

MORTISING MACHINES
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machy. Co., Toronto, Ont.
Gray Ball Bearing Co., Ltd., Toronto.

MOTORS, ELECTRIC
Can. Fairbanks-Morse Co., Montreal.
Can. General Electric Co., Toronto.
Garlock-Walker Machy. Co., Toronto, Ont.
Lancashire Dynamo & Motor Co., Ltd., Toronto.
MacGovern & Co., Montreal, Que.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MOTOR SPRINGS
The Dunbar Brothers Co., Bristol, Conn.

MOTORCYCLE FRAME AND FORK
The Dunbar Brothers Co., Bristol, Conn.

MOTORS, PNEUMATIC
Cleveland Pneumatic Tool Co., Toronto.

MULTIPLE INDEX CENTRES
Garvin Machine Co., New York.

MULTI-DRILLING, MULTI-BORING, MULTI-TAPPING MACHINERY.
Nat. Automatic Tool Co., Richmond, Ind.

MUNTZ METAL
Brown's Copper & Brass Roller Mills, New Toronto, Ont.

NAIL SETS
Morrow Screw & Nut Co., J., Ingersoll, Ont

NAIL MACHINERY
Sleeper & Hartley, Inc., Worcester, Mass.

NAME PLATES, BRONZE, ETCHED AND STAMPED
Matthews & Co., Jas. H., Pittsburgh, Pa.
Pritchard-Andrews Co., Ottawa, Ont.
Turner Brass Works, Sycamore, Ill.

NICHROME CASTINGS
Can. Driver-Harris Co., Ltd., Walkerville.

NICKEL
Roker & Co., Inc., H., Montreal, Que.
Pilot Steel & Tool Co., Montreal, Que.

NICKEL SILVER
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.

NICKEL STEEL
See Steel.

NIPPLE HOLDERS
Curtis & Curtis Co., Bridgeport, Conn.

NIPPLE THREADING MACHINES
Hall & Sons, Ltd., John H., Brantford.
Landis Machine Co., Waynesboro, Pa.

NITROGEN
Carter Welding Co., Toronto, Ont.

NUTS, STEEL, CASTELLATED AND COLD PRESSED
Galt Machine Screw Co., Ltd., Galt, Ont.
Morrow Screw & Nut Co., J., Ingersoll, Ont
Williams & Co., J. H., Brooklyn, N.Y.

NUTS, SEMI-FINISH AND FINISHED
Galt Machine Screw Co., Galt, Ont.
National-Acme Co., Cleveland, Ohio.
Wilkinson & Kompass, Hamilton.

NUT BURRING AND NUT MACHINES (HOT)
National Machy. Co., Tiffin, Ohio.

NUT FACING AND BOLT SHAVING MACHINES
Garvin Machine Co., New York.
National Machinery Co., Tiffin, Ohio.
Victor Tool Co., Waynesboro, Pa.
Williams & Wilson, Ltd., Montreal, Que.

NUT TAPPERS
Bertram & Sons Co., John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Garvin Machine Co., New York.
Hall & Son, J. H., Brantford, Ont.
Jardine & Co., A. B., Hespeler.
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., Tiffin, Ohio.
Williams & Wilson, Ltd., Montreal, Que.

OIL SEPARATORS
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Carborundum Co., Niagara Falls, N.Y.
Norton Co., Worcester, Mass.
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OIL STORAGE SYSTEMS
Bowser & Co., Inc., S. F., Toronto, Ont.

OPENING DIE HEADS
Greenfield Tap & Die Corp, Greenfield.
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OPTICAL SUPPLIES
Consolidated Optical Co., Toronto, Ont.

OSCILLATING VALVE GRINDERS (PNEUMATIC)
Cleveland Pneumatic Tool Co. of Canada, Toronto.

OVENS FOR BAKING, BLUING, DRYING, ENAMELING, JAPANNING AND LACQUERING
Brantford Oven & Rack Co., Brantford.

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Welding & Supplies Co., Montreal, Que.
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OXY-ACETYLENE WELDING AND CUTTING AND OUTFITS
Carter Welding Co., Toronto, Ont.
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Cleveland Wire Spring Co., Cleveland.

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Graton & Knight Mfg. Co., Worcester, M.
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Frost Mfg. Co., Chicago, Ill.

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Bertrams, Ltd., Edinburgh, Scotland.
Can. Link-Belt Co., Toronto, Ont.
MacKinnon Steel Co., Sherbrooke, Que.

PARTITIONS, WIRE
See Guards

PAPER MILL MACHINERY
Garlock-Walker Machinery Co., Toronto.

PATTERN SHOP EQUIPMENT
Canada Machinery Corp., Galt, Ont.
Oliver Machy. Co., Grand Rapids, Mich.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PATTERN MAKERS' LATHES
See Lathes.

PATENT SOLICITORS
Budden, Hanbury A., Montreal.
Fetherstonhaugh & Co., Ottawa.
Marion & Marion, Montreal.
Ridout & Maybee, Toronto.
Wilson & Co., J. C., Belleville, Ont.
Greenleafs Ltd., Belleville, Ont.
Marten Machine Co., Hamilton, Ont.

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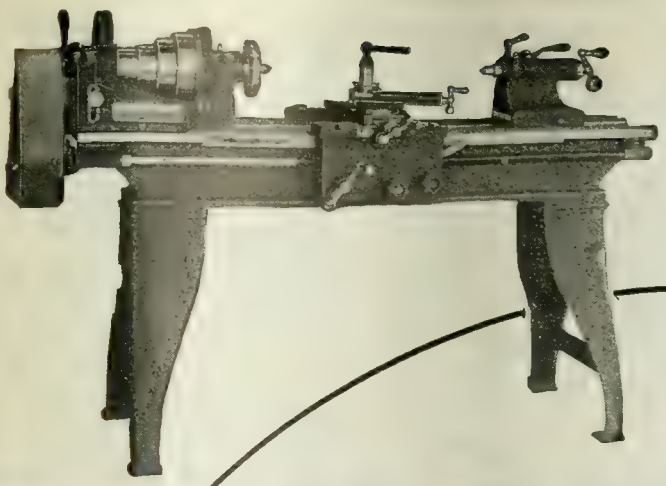
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Can. Fairbanks-Morse Co., Montreal
Fox Machy. & Sply Co., G. F., Montreal
Gardner & Son, Robt., Montreal.
Garlock-Walker Machinery Co., Toronto.
Garvin Machine Co., New York.
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Can. Billings & Spencer, Ltd., Welland.
Peck, Stow & Wilcox Co., Southington, Ct.
Rice Lewis & Son, Toronto, Ont.

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Cleveland Pneumatic Tool Co., Can., Toronto
Curtis Pneumatic Machy. Co., St. Louis
Garlock-Walker Machy. Co., Toronto.
Int. Mach. & Supply Co., Ltd., Montreal
Independent Pneumatic Tool Co., Chicago

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MacKinnon Steel Co., Sherbrooke, Que.

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Brown & Sharpe Mfg. Co., Providence, R.I.
Ford-Smith Machine Co., Hamilton, Ont.
Williams & Wilson, Ltd., Montreal, Que.

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Elec. Steel & Metals, Welland, Ont.

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Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Canada, Galt, Ont.
Williams & Wilson, Ltd., Montreal, Que.

POWER HOUSE CONVEYORS

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Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.

POWER TRANSMISSION MCHY.

Williams & Wilson, Ltd., Montreal, Que.

PRESSED STEEL PARTS

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Williams & Wilson, Ltd., Montreal, Que.

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Bliss Co., E. W., Brooklyn, N.Y.
Metalwood Mfg. Co., Detroit, Mich
Toledo Machine & Tool Co., Toledo.
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Baird Machine Co., Bridgeport, Conn.
Bliss Co., E. W., Brooklyn, N.Y.
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Toledo Machine & Tool Co., Toledo.
Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

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Can. Fairbanks-Morse Co., Montreal.
Niles-Bement-Pond Co., New York.
Perrin, Ltd., William R., Toronto.
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co, Toledo.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, HYDRAULIC

Bertram & Sons Co., John, Dundas.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
Perrin, Ltd., William R., Toronto.
Toledo Machine & Tool Co., Toledo.
Stoll Co., Inc., D. H., Buffalo, N.Y.
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West Tire Setter Co., Rochester, N.Y.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, BALING

Perrin, Ltd., William R., Toronto.

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Baird Machine Co., Bridgeport, Conn.
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Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Consolidated Press Co., Hastings, Mich.
Garlock-Walker Machinery Co., Toronto.
Perrin, Ltd., William R., Toronto.
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Toledo Machine & Tool Co., Toledo.
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Bliss Co., E. W., Brooklyn, N.Y.
Canada Machinery Corp., Galt, Ont.
Consolidated Press Co., Hastings, Mich
Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

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Can. Fairbanks-Morse Co., Montreal.
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Jones & Glasseo, Montreal.
Williams & Wilson, Ltd., Montreal, Que.

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Darling Bros., Ltd., Montreal, Que.
Pratt & Whitney Co., Dundas, Ont.
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Trahern Pump Co., Rockford, Ill.

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PUMPS, HIGH PRESSURE

Perrin, Ltd., William R., Toronto.

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Perrin, Ltd., William R., Toronto.
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Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Montreal.
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A. B. Jardine & Co., Hespeler, Ont.
Marshall, Son & Blunney, Toronto.
Marten Machine Co., Hamilton, Ont.
Peck, Stow & Wilcox Co., Southington, Ct.
Pilot Steel & Tool Co., Montreal, Que.
Pratt & Whitney Co., Dundas, Ont.
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo, O.
Williams & Wilson, Ltd., Montreal, Que.

PUNCHES HAND

Peck, Stow & Wilcox Co., Southington, Ct

PUNCHES, POWER

John Bertram & Sons Co., Dundas, Ont.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd. Hamilton, Ont.
Canada Machinery Corp., Galt, Ont
Consolidated Press Co., Hastings, Mich.
Garlock-Walker Machinery Co., Toronto.
A. B. Jardine & Co., Hespeler, Ont.
Long & Allstatter, Hamilton, Ohio
Niles-Bement-Pond Co., New York
D. H. Stoll Co., Buffalo, N.Y.
Wickes Bros., Saginaw, Mich.
Williams & Wilson, Ltd., Montreal, Que

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Bertrams, Ltd., Edinburgh, Scotland.
Bertrams & Sons, John, Dundas, Ont
Canada Machinery Corp., Galt, Ont
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co. Ltd., Hamilton, Ont
Garlock Walker Mach'y Co., Toronto.
Niles-Bement-Pond Co., New York.
Wickes Bros., Saginaw, Mich.
Williams & Wilson Ltd., Montreal, Que

PYROMETERS

Bristol Co., Waterbury, Conn
Shore Instrument & Mfg. Co., New York
Taylor Instrument Co., Rochester, N.Y.

QUARTERING MACHINES

Bertram & Sons, John, Dundas, Ont.
Niles-Bement-Pond Co., New York.

RAIL BENDERS

Algoma Steel Corp., Sault Ste. Marie, O.
Niles Bement-Pond Co., New York.

RAILROAD TOOLS

Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machinery Co., Toronto
Niles-Bement-Pond Co., New York.
Williams & Wilson, Ltd., Montreal, Que.

RASPS

Atkins & Co., Ltd., Wm., Sheffield, Eng.
Marshall, Son & Bunney, Toronto.
John Morrow Screw & Nut Co., Ingersoll.

RATCHETS

Atkins & Co., Ltd., Wm., Sheffield, Eng
Keystone Mfg. Co., Buffalo, N.Y.
Marshall, Son & Bunney, Toronto

RAWHIDE PINIONS (See Gears)

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Illinois Tool Works, Chicago, Ill.
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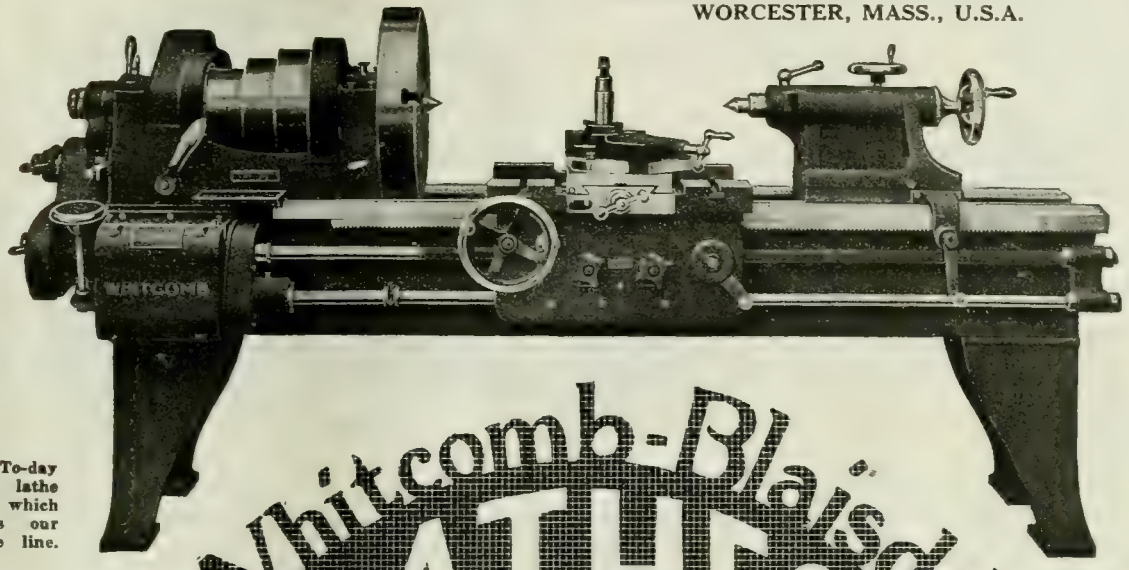
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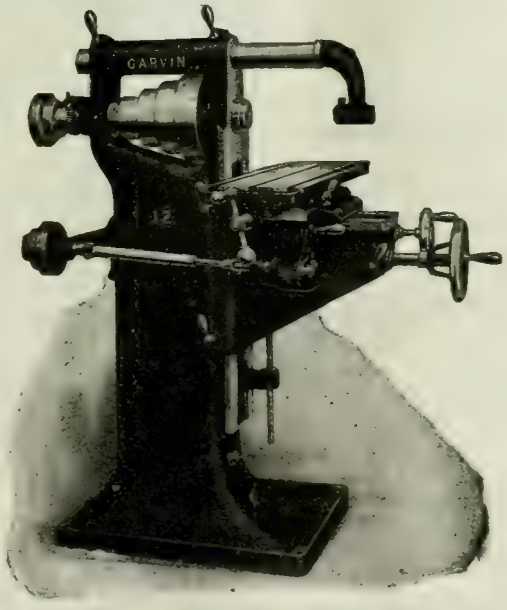
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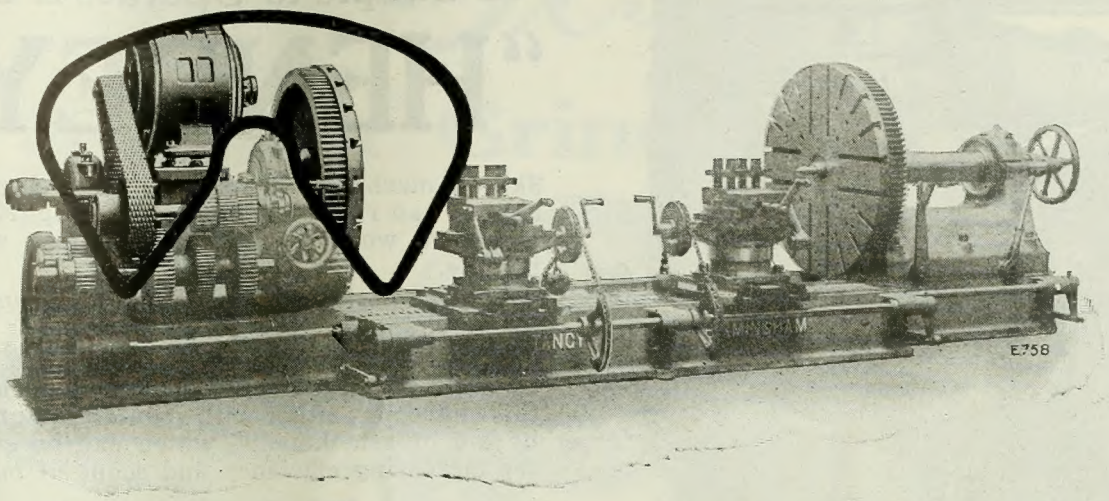
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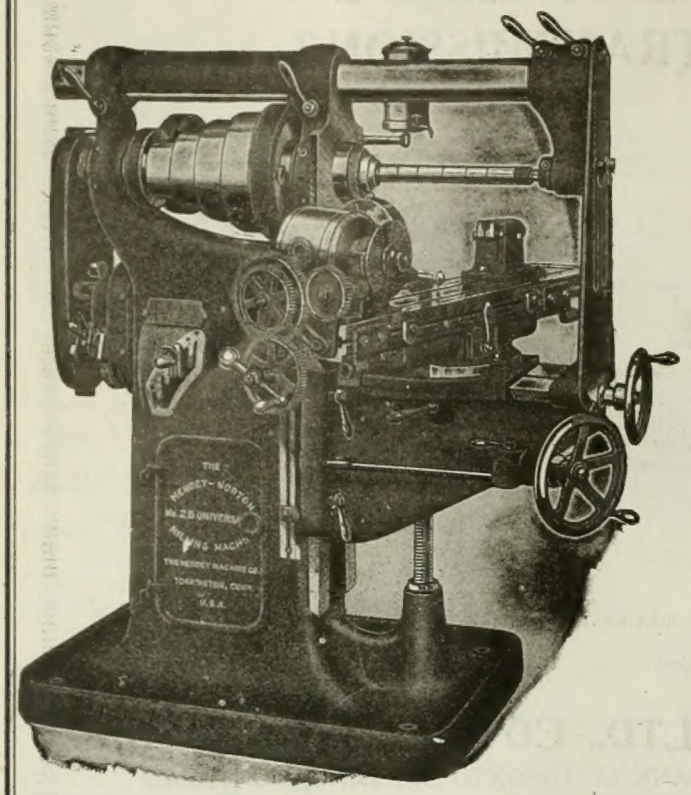
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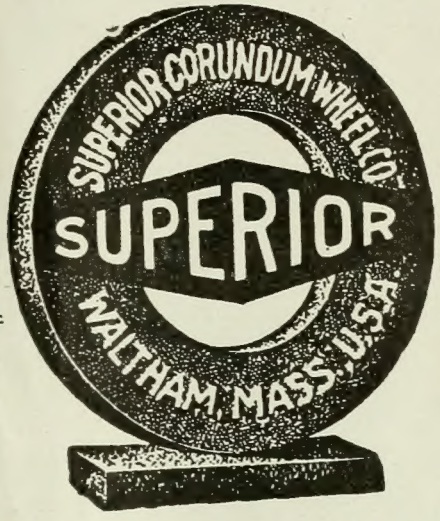
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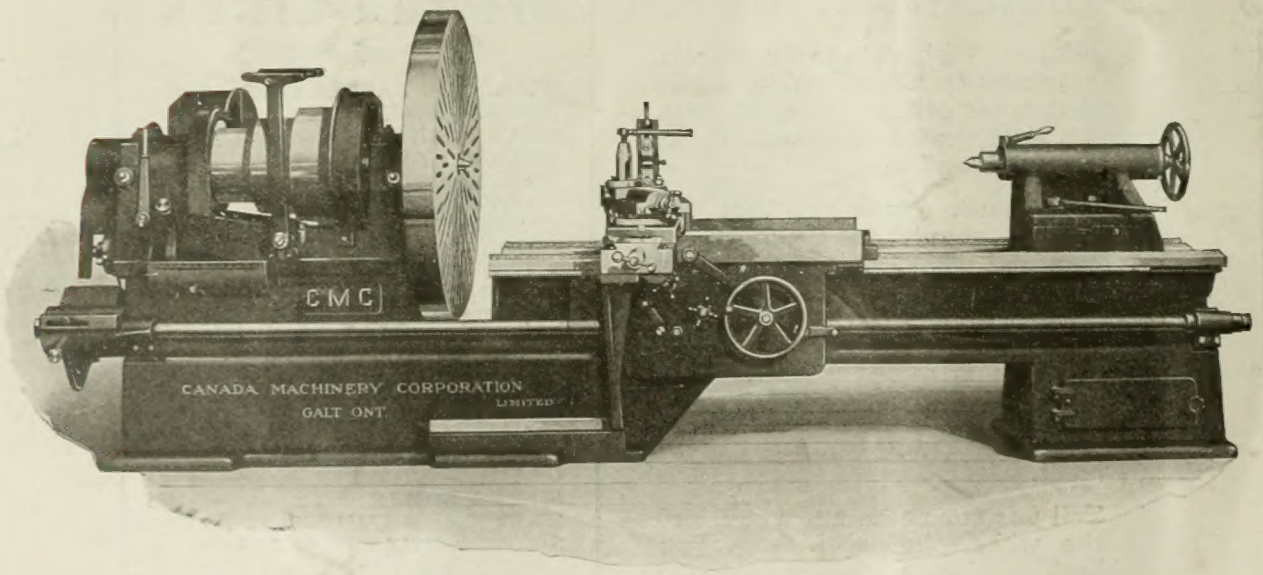
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